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ERRATUM.

P. 369, line 13 from bottom: For "5,163,000 acres.....were occupied by orchards," etc., read "5,215,000 acres.....were occupied by agricultural land, including orchards," etc.



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THE SPRAYING OF FRUIT TREES.

Many fruit-growers in England are recognising that they cannot depend upon a crop of fruit unless they spray their trees in the spring. Insects are increasing so rapidly in orchards and fruit plantations, especially those which devour the leaves and blossoms as soon as they appear, that it is absolutely necessary to check them in the early stages of growth. Foreign fruit-growers have realised this for some time past, and spray their fruit trees regularly, and as a part of the routine of ordinary cultivation. American and Canadian growers, or at least the most intelligent and advanced among them, spray their fruit trees systematically, beginning as soon as the leaves show, and continuing until the trees are free from infestation.

In the case of the several caterpillars which infest apple, pear, and plum trees, their attack commences even before the buds begin to burst. A little warmth in the first days of early spring causes the caterpillars to come from the eggs, when they find their way quickly into the buds and commence feeding on them. If the surroundings are made unpleasant by spraying with paraffin emulsion, or quassia and soft soap solutions, the young caterpillars, which are very small indeed in their early stages, fall to the ground; or if their first food is poisoned by spraying the bursting leaves

with Paris Green, they are quickly killed. This is the most effectual way of preventing serious infestation by caterpillars of the Winter moth and its several allies, and of other biting insects, and it is becoming rather more general in this country, at least in the case of fruit trees under which there are no fruit bushes, such as gooseberries and currants, or grass that may be eaten by sheep or cattle. For aphides and other sucking insects, such as the *Psylla mali*, spraying with strong solutions of quassia and soft soap, in the proportion of 7 lbs. to 9 lbs. of quassia chips and 8lbs. of soft soap to 100 gallons of water, is of great advantage, especially if it is done early and repeated once or twice. In some instances growers spray three times during May and June. Where spraying is adopted it is found that grease-banding is unnecessary, and much expense is saved, and risk of failure avoided; for unless grease-banding is thoroughly done, and the bands kept in working order until the spring, it may be useless, as some varieties of moths do not ascend the trees for the purpose of laying eggs until March.

In the United States Paris Green solutions are made by dissolving 1 lb. of Paris Green in from 180 to 200 gallons of water. Two pounds of quicklime are often put in this mixture to neutralise the arsenical acid and prevent the scorching of the leaves.

Kerosene or paraffin emulsion is made by mixing two gallons of kerosene or paraffin in one gallon of water in which half a pound of soft soap has been boiled. This must be thoroughly churned up together, and diluted with nine parts of water, and then put on in a fine spray in cases of attacks by sucking insects. The quassia and soft soap solution so largely used in England against sucking insects is not adopted in America.

There is often great waste in getting the extract from the quassia chips. The proper mode is to steep the chips in cold water, so that the extract may be gradually produced; but to save time and trouble most fruit-growers and hop-growers boil the chips: a process which entails much loss. Upon a few large farms there are tanks specially made for steeping quassia chips.

For fungoid attacks Bordeaux mixture is sprayed over fruit trees to destroy the spores of scab fungus and other injurious fungi. This is made with 8 lbs. of sulphate of copper and 8 lbs. of quicklime mixed well together with 100 gallons of water. Very often Paris Green is added to the sulphate of copper solution in order to kill caterpillars and other insects. In the early spring, before the buds begin to open, American growers spray fruit trees with a mixture of 6 lbs. of sulphate of copper in 100 gallons of water to kill the spores of fungi causing scab, rot, etc., and when the blossoms have fallen a much more diluted solution is used, made with $\frac{1}{4}$ lb. to $\frac{1}{2}$ lb. of sulphate of copper to 100 gallons of water.

A mixture that is much in use in America and Canada for cleansing fruit trees is made by dissolving $1\frac{1}{2}$ lbs. to 2 lbs. of crude potash in three gallons of water. This is sprayed all over the trees in the late autumn or winter.

There are in America numerous varieties of machines for distributing insecticides and fungicides; but they do not appear to be more serviceable than some of those in use in this country. The objects desired are light and speedy draught, greatly economised space, strong pumps, and easy adaptation to variations in width of planting, and the size of trees. There is not much difficulty in getting suitable machines. The perfect distribution of the dressing depends, however, more on the nozzles employed, of which there is also a large variety. Mr. Lodeman, who has written exhaustively on this subject*, gives an admirable definition of the best spray nozzle, so far as efficiency, simplicity, and cheapness are concerned, viz., "the end of a hose and a man's thumb." He adds, "Unfortunately the thumb gets sore and tired, and operations must be suspended to wait for repairs. It is the nearest approach to the ideal nozzle yet devised if it were only more practicable. It will do what a good nozzle should do. It throws a fine mist-like spray, one that 'will float in the air like a fog,' or the

* The Spraying of Plants, a succinct account of the history, principles, and practices of the application of liquids and powders to plants for the purpose of destroying insects or fungi, by L. G. Lodeman, Instructor in Horticulture in the Cornell University, U.S.A. (Macmillan and Co.)

particles of water may instantly be made coarser, and the water thus carried to a greater distance, or still coarser and the water leave the hose in the form of a solid stream. The nozzle never clogs, but is cleared automatically, and as quickly as the character of the spray is varied. In fact it possesses all the desirable qualities of a spray nozzle except durability, and for this we must turn to the metals for aid." Much labour and solutions of all kinds are wasted in spraying, and the same nozzles are often used for quite different objects. As a rule, spraying solutions should be applied in the form of a fog, or mist, with impetus sufficient to let it fall like gentle rain upon the buds, leaves, twigs, and branches; but there is, of course, this difficulty, that a fine mist or fog-like spray cannot be carried to any height, and for this purpose there must be some volume of the solution. And if there is a large volume, the force of the pump drives it quickly over the parts to be sprayed, and but little of the solution is deposited upon them. Mr. Lodeman holds that, if the parts to be treated are not far off, a fine spray is to be preferred, as there is then less waste and an even application may be made. If the parts to be treated are farther away, a coarser spray, he says, is required, and the more distant the object the coarser the spray. He concludes that when a coarser spray is applied there is generally enough of the finer spray formed to float in the air and cover parts not directly reached by it. It must, however, be said that where possible it is far more desirable to spray with fine than with coarse spray, and to use those nozzles which have "eddy-chambers" in which two streams of water strike each other at angles, rather than those which discharge the water in a solid volume. In short, there is as much scientific and practical knowledge required in selecting proper nozzles as in making the various solutions, and great improvements have been made in the last few years in this direction, both in America and in this country. But, as Mr. Lodeman remarks, the ideal nozzle has not yet been made in metal, though some of the forms now obtainable approach perfection.

IMPORTS OF BACON AND HAMS INTO THE UNITED KINGDOM.

Our imports of bacon and hams have shown a steady upward tendency during the past five years, the growth in that interval having been from 4,819,000 cwts., valued at £10,856,000, in 1894, to 7,683,000 cwts., declared to be worth £14,216,000, in 1898. On only four occasions prior to 1894 have the annual importations of these articles exceeded in the aggregate the quantity received in that year. The supply of the past twelve months consisted of 5,711,000 cwts. of bacon and 1,972,000 cwts. of hams, valued at £10,322,000 and £3,894,000 respectively.

The principal contributor of these products to our markets is the United States, whence we have received for many years about 80 per cent. of the entire foreign supply, the remainder being chiefly accounted for by Denmark and Canada. The quantities credited to each of these countries in the Trade Returns since 1894 are in round numbers as follows :—

Years.	UNITED STATES.		DENMARK.		CANADA.	
	Bacon.	Hams.	Bacon.	Hams.	Bacon.	Hams.
	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.
1894	- 2,561,000	1,075,000	767,000	1,800	254,000	51,000
1895	- 2,649,000	1,203,000	1,014,000	1,800	269,000	82,000
1896	- 2,752,000	1,286,000	1,222,000	1,900	457,000	169,000
1897	- 3,593,000	1,604,000	1,027,000	980	290,000	119,000
1898	- 4,087,000	1,852,000	1,018,000	900	536,000	117,000

It will be seen that American produce preponderates largely, and for a considerable period it has constituted the

major part of the imports of foreign bacon into this country. It is sometimes supposed that the bacon received from transatlantic sources is mainly of Canadian origin, and that the exports from the ports of the United States include consignments in transit from the Dominion. That this is not the case may be proved by reference to the Trade Returns of the two countries concerned. From the United States the exports of bacon of home production are stated to have ranged during the five years ended June 30th, 1898, from 3,720,000 cwts. to 5,800,000 cwts. yearly, and about 75 per cent. of these consignments were directed to British ports, the remainder going chiefly to Belgium, Germany, the Netherlands, and Canada. In the same period the exports of bacon and hams from the Dominion ranged from 250,000 cwts. to 760,000 cwts. annually, and nearly the whole was shipped directly to the United Kingdom, the quantity sent to the United States exceeded 1,000 cwts. in only one year.

The prices of bacon and hams are subject to greater fluctuations than those of other meat products; but in the five years dealt with in the above statement their movement was on the whole retrograde. For bacon the average import value in 1894 was 43s. 10d. per cwt., which was not unusually high; in the next twelve months there was a drop of 4s. 10d., followed by a further fall of 4s. 6d. in 1896, when the declared value was 34s. 6d.; but in each of the subsequent years there was a slight recovery, which brought the average for 1898 up to 36s. 2d. per cwt. Hams presented a descending scale of values throughout the whole period, their average falling from 49s. 1d. to 39s. 6d. per cwt. The latter amount is the lowest average value recorded for imported hams in the past thirty years.

American bacon and hams realise lower prices than the Canadian, but both are inferior in value to the Danish consignments of these products.

In view of the important position occupied by the United States as a purveyor of bacon to our markets, considerable interest attaches to the change in the swine stock of that country. The number of swine in the United States on the 1st January, 1899, according to the official Returns, was

38,651,631, this total showing a decrease of about 1,100,000 head from the previous year, and being lower than in any year since 1882. The decline has been continuous since 1892, when the number of pigs was returned at over 52 millions. With regard to their distribution in the various states at the present time, Iowa has the largest number, viz., 3,408,000 head. Five other states have over two millions each : these are Missouri, Texas, Ohio, Georgia, and Illinois ; while 11 states have over one million each. Out of the total of 38½ millions, the twelve states of Ohio, Indiana, Illinois, Iowa, Missouri, Kansas, Nebraska, Minnesota, Wisconsin, Michigan, Kentucky, and Tennessee, which are chiefly engaged in the bacon curing or "packing" trade, account for 20,000,000 head, leaving for the remaining 36 states about 18½ millions. It may be noted that the decline above referred to in the total number of swine in the country is almost confined to the "packing" states.

The breed which is stated to number as many individuals as all other breeds combined in the United States is the Poland-China, a pre-eminently American product, which originated in Ohio between the years 1838 and 1840, in the crossing of various families known there as Big China, Byfield, Bedford and Irish Grazier, the offspring being a large and somewhat coarse black and white spotted swine. These have been crossed with Berkshires, and incidentally they have acquired much of the Berkshire's conformation and markings. The Berkshire pig is also a favourite in America, and other popular types are Chester Whites and Duroc Jerseys, both being large breeds produced in the country from the blending of different races. The Yorkshire, Tamworth, Essex, and Suffolk breeds are also raised in the United States ; but they are not an important factor in the bacon trade of the country.

Denmark, which ranks next to the United States as an exporter of bacon to British markets, possessed 829,000 swine in 1893, and of this number nearly 400,000 were owned by farmers in Jutland. The popular breed of pig amongst Danish farmers is descended from the Large and Medium White Yorkshire breed. Formerly it was the practice in Denmark to

import breeding swine from England, and the best herds are still maintained by the frequent introduction of fresh English blood. But many of the local agricultural societies in Jutland and Zealand have recently established, either alone or in conjunction with the bacon-curing factories, breeding stations for recognised types of swine, which are hired out or sold to members and others for the improvement of their herds. At the present time 69 such stations have been started for the rearing of good types of native swine, and ten similar establishments have been founded by co-operative societies for the breeding of pure Yorkshire pigs.

Another institution which has contributed to the development of the bacon industry in Denmark is the co-operative curing factory. The first establishment of this character was opened in 1887 by an association of farmers in the district of Horsens, and after the closing of the German ports to live swine from Denmark, in the winter of 1887-88, bacon factories sprang up in all parts of the country. According to the latest returns there are now 25 co-operative factories of this kind in operation in the kingdom, in addition to a number run by private individuals or companies.

In the case of the factories established by the farmers' associations, the funds for the erection of the necessary buildings were generally derived from a loan effected on the security of the founders, each member being expected to become a guarantor for an amount not exceeding 50*l.*, the sum guaranteed by each individual determining the extent of his ownership in the concern. The administration of the association is vested in a council elected by the members. The employes usually consist of a manager, a bookkeeper, and a cashier.

The regulations of the co-operative bacon factories in Denmark agree very much in their general principles. It is usually stipulated that the members of the association shall deliver all their saleable swine to the factory for a period of seven years, except in the case of removal from the district. This stipulation, however, does not apply to boars, to sows in farrow, or to young pigs under 56 lbs. (in some cases 112 lbs.) live weight, nor does it extend to pigs sold by a

member to his labourers, or consumed in his own house. A corresponding obligation is nearly always imposed on the association to accept all the healthy swine consigned by a member to the factory. A member may purchase any number of pigs from another member of the association, and send them to the factory, provided he has fattened them for a period varying from 20 to 30 days before delivery. But he is not allowed to send in one year more than ten pigs purchased from non-members. The association usually defrays the expenses incurred in conveying the swine from the nearest railway station to the factory; all other charges for carriage are paid by the consignors. On removal to the factory, the pigs are divided into classes according to quality, the values of the different classes being fixed weekly by the council on the advice of the manager. In some cases the prices are paid according to dead weight, but in the older establishments payment is still determined by the live weight. The offal is generally sold to the members of the association, or to the general public, at the current prices of the day.

At the close of the year the profits arising from the operations of the association are distributed amongst the members, after provision has been made for the payment of the working expenses, the allocation of a certain sum to the reserve fund, and the part repayment of loans. Each member receives a share of the profits in proportion to the weight of pork he has delivered during the year. The amount carried to the reserve fund is determined annually by the council.

The net exports of bacon and hams from Denmark during each of the past five years have been as follows:—

	Cwts.
1893-94 - - - - -	836,000
1894-95 - - - - -	976,000
1895-96 - - - - -	1,373,000
1896-97 - - - - -	1,228,000
1897-98 - - - - -	1,093,000

Nearly the whole of these shipments were taken by the United Kingdom.

The managing committees of 21 of the co-operative bacon factories in Denmark have now combined for the purpose of regulating their output and thereby maintaining prices at a remunerative level. The gross turnover of these

21 factories in the year 1897 amounted to nearly £1,192,000, and the total number of hogs slaughtered in them in the same year was 487,302. At the instigation of the joint committee of these establishments, experiments are being carried out in the State Laboratory at Copenhagen to test the relative values of different processes of curing bacon.

Although the exports of Canadian bacon and hams are increasing yearly, the trade of the Dominion in these products has not yet assumed the dimensions to which it has attained in Denmark. The quantities shipped from all ports in Canada in the year ended June, 1898, were 686,000 cwts. of bacon and 75,000 cwts. of hams, all but a few thousand pounds being consigned to the mother country.

The latest complete returns relating to the number of swine in the Dominion are for the year 1891, when there were estimated to be 1,733,850 pigs, distributed as follows :—

Ontario	-	-	-	-	-	-	1,121,396
Quebec	-	-	-	-	-	-	369,608
Nova Scotia	-	-	-	-	-	-	48,048
New Brunswick	-	-	-	-	-	-	50,945
Manitoba	-	-	-	-	-	-	54,177
British Columbia	-	-	-	-	-	-	30,764
Prince Edward Island	-	-	-	-	-	-	42,629
The Territories	-	-	-	-	-	-	16,283

Later returns for Ontario show that the number of swine in that province in 1898 was 1,643,000, while in Manitoba, in the same year, 69,650 pigs were enumerated.

EXPORTS OF BRITISH LIVE STOCK.

There has been during the past five years a noteworthy increase in the annual value of the exports of British and Irish live stock. This improvement is to be credited almost entirely to larger shipment of horses, though sheep also participated in the advance.

In 1894 the declared value of the aggregate outward consignments of all kinds of home-bred farm stock, exclusive of poultry, was £632,400, and it has since risen to over £1,000,000. The number of animals represented by these sums is given in the following statement, which shows the annual exports of each class of stock with the declared values.

Years.	Horses.	Cattle.	Sheep.	Swine.
	No.	No.	No.	No.
1894- - -	16,457	8,280	4,638	1,368
1895- - -	21,564	7,951	6,966	3,069
1896- - -	29,414	4,369	9,512	359
1897- - -	34,471	3,776	11,569	214
1898- - -	36,412	2,861	10,224	434
VALUE.				
	£	£	£	£
1894- - -	449,804	135,125	39,522	7,921
1895- - -	549,882	132,413	59,760	13,956
1896- - -	671,332	122,004	107,507	2,847
1897- - -	825,246	119,548	147,714	1,700
1898- - -	842,106	94,414	120,310	3,231

Although the increase shown in the case of horses may be said to be a continuation of a movement which has been in progress, with fluctuations, for the past twenty years, the growth during the period covered by the above statement represents a remarkable advance in this trade and merits some

attention. The numbers of stallions, mares and geldings shipped in each year were as follows :—

Years.	Stallions.	Mares.	Geldings.
1894 - - -	259	2,891	13,307
1895 - - -	583	3,603	17,378
1896 - - -	617	4,586	24,211
1897 - - -	590	7,130	26,751
1898 - - -	528	7,928	27,956

For the first of the five years quoted the declared value of the aggregate consignments of all kinds of horses was £450,000, from which level there was an uninterrupted rise yearly to £842,000 in 1898. The details of this latter sum are not yet available; but in 1897, when the total shipments were valued at £825,000, stallions accounted for £68,000, mares for £272,000, and geldings for £485,000.

The value per head of the animals shipped varies considerably, the range being widest, as a rule, in the exports of entire horses, which sometimes include celebrated racing stallions and other pure blood sires. As an example of the extent to which the exportation of a few thoroughbreds of this class may affect the trade returns of a single year, reference may be made to the accounts for 1894, which included two stallions, valued at £18,000, sent to Austria. But these entries have their set-off in a shipment recorded in the same year of a stallion declared to be worth only £10. Similar divergences, though not so extreme, occur in other years. In 1897 the range was from £25 to £430. It is evident, therefore, that the mixed character of the trade makes an average based upon the total figures an imperfect indication of the class of animal in demand.

Subject to these various considerations, it may be noted that Germany has been the principal destination of the British and Irish stallions exported in recent years, and that regular shipments have been made, on a smaller scale, to France, Russia, the Cape, Argentina, and the United States. The average value per head of the consignment of entire horses in 1897 to each of the countries named in the above order was £55, £430, £170, £218, £130, and £226 respectively.

The export of mares, in which the range of value is usually much more restricted than in the class of entire horses, has for some years been directed chiefly to Belgium, France, Germany, and Holland. In 1897 the numbers shipped to each of these countries were 3,698, 1,683, 703, and 661 respectively, and their declared value averaged £23, £63, £46, and £36. The four countries last named are also the chief consignees for geldings, the shipments destined to each in 1897 being as follows :—

	No.	Value.	Value per head.
		£	£ s.
Belgium - - -	16,046	189,054	11 16
Holland - - -	6,465	59,162	9 3
France - - -	2,973	187,564	63 2
Germany - - -	915	29,594	32 7

The total value of all the geldings exported in the same year was £484,832, the range being from £6 12s. to £130 per head : the few animals approaching the maximum included 48, averaging £81 each, sent to the Cape ; 10, at £78 each, to Canada ; 9, at £110 each, to Argentina ; and 4, at £130 each, to Portugal.

With regard to the trade in horses generally, it may be observed that, besides the purchases of English thoroughbreds for stud purposes abroad, there is a certain demand on the part of a few Continental countries for cavalry remounts and carriage and riding hacks. Thus, Belgium is reported to purchase about 800 Irish horses annually for her cavalry and artillery, Germany also imports English and Irish horses to serve as officers' chargers, and France takes between 2,000 and 3,000 superior geldings for riding and driving. On the other hand, the shipments to Belgium and Holland include many animals of small value, intended for slaughter.

In some of the countries referred to above there are fiscal and other restrictions on the importation of horses. Argentina admits breeding horses duty free, but the animals are subjected to the mallein test for glanders. Germany levies a duty of 10s. per head for horses two years of age and under, and 20s. for those exceeding that age ; a certificate of health must accompany them, and they are kept in quarantine for ten days. In France imported horses are subjected

to veterinary inspection and quarantine; they must also be accompanied by a certificate that the locality from which they came was free from glanders. The French tariff on horses imported from the United Kingdom is as under.

	Per head.
Stallions, geldings and mares, 5 years old and over - - - - -	£ 6
Ditto, under 5 years - - - - -	4
Colts - - - - -	2

Horses imported into Belgium are inspected on debarkation, and suspected animals must undergo the mallein test, but no duty is levied on them. The importation into Holland is also duty free, but horses not intended for slaughter must be accompanied by a certificate of health, and may be subjected to the mallein test on landing; in cases in which this test is dispensed with the animals are kept in quarantine for a period not exceeding three months. In the United States the tariff on horses and mules valued at £31 5s. or less is £6 5s., whilst on animals of a greater value it is 25 per cent. *ad valorem*.

The numerical decline shown in the figures for cattle is to be discounted by the fact that the exports of 1894 and 1895 were exceptional, since they included large consignments of store animals to Belgium and France, to make up deficiencies (caused by drougthy seasons) in the herds in those countries. If this unusual trade be excluded from consideration, the movement in horned stock will be found to have been, on the whole, of a satisfactory character. A noteworthy feature was a revival of the demand for pure-bred animals on the part of Argentina, which took place chiefly in 1896 and 1897. The Argentine Republic has been for some years the principal customer for British pedigree cattle, and her purchases in the period under consideration were as follows:—

Year.	No.	Value.	Value per head.
1894	167	£ 8,799	£ s. 52 14
1895	382	22,617	59 4
1896	989	60,549	61 4
1897	867	63,658	73 8
1898	511	39,809	77 18

The continued introduction of English blood stock into Argentine herds has been an important factor in the improvement of the native stock, and has enabled breeders in that country to compete with increasing success in the trade in beef cattle for the markets of the United Kingdom. The original cattle of Argentina were small, long-horned, thick-hided, slow-growing beasts, of every conceivable colour. But for the last twenty years a brisk reformation has taken place, and there are few herds left now that do not own to some degree of English blood. The most popular breed for crossing purposes is the Short-horn, and this still continues to be most in demand. The Hereford also has many advocates, and the live export trade has drawn considerable attention to the polled Angus.* There is no duty on cattle imported into the Republic for breeding purposes, but the animals are subjected to the tuberculin test on landing. Among minor outlets for pedigree cattle in the five years under review were Chili, Uruguay, and Australia.

In addition to the trade in pedigree stock there is a constant, though fluctuating, exportation on a small scale of beef cattle, mainly to the Channel Islands. The number of beasts shipped to this destination ranged from 2,300 to 2,800 head annually between 1894 and 1897, but last year the consignments numbered only 1,361 head.

The improvement in the export trade in sheep is due, in the main, to an increase in the demand by Argentine flock-masters for English pure-bred animals. The consignments to Argentina rose from 1,737 head valued at £22,400 in 1894, to 8,237 head of the value of £119,600 in 1897, though in 1898 they dropped to 6,632 head declared to be worth £94,000; the average value per head of these shipments over the whole period of five years was £13 12s. The sheep stock in Argentina appears to have received greater attention at the hands of the breeder than either the cattle or horses. Up to 1880 the sheep were almost entirely of a Merino strain, but about that period the frozen mutton industry was first instituted, and the breeders, finding the carcass of the

* See Foreign Office Report, Miscellaneous Series, No. 369. 1895.

merino of little value for export, turned their attention to English breeds, and particularly to the Lincoln sheep. Between 1884 and 1894 nearly all the sheep held in the south of the province of Buenos Ayres were converted from Merino into Lincoln.* The Leicester, Cotswold, and Romney Marsh breeds have also been introduced, but in a smaller degree. Oxford Downs, Southdowns, and Hampshire Downs are to be found in limited numbers, chiefly in the lucerne lands of the province of Santa Fé, where they appear to do well.

Pure-bred sheep are also exported from the United Kingdom to Germany, France, the United States, the Cape, Australia, Uruguay, and occasionally to other countries. A new feature of some interest is the recent demand for British rams for cross-breeding purposes in Russia. This is connected, according to Mr. Mackie, Her Majesty's Consul-General at Odessa, with the endeavours made by the Russian Imperial Agricultural Society to create out of the merino sheep a mutton sheep suitable for the British and French markets. The Russian Government has assisted the movement by assigning a small grant for the purchase of rams of English breeds.

In most of the countries named above, the restrictions on the importation of British sheep for breeding purposes are confined to the inspection of the animals by a veterinary surgeon at the port of arrival. But the regulations in force in most of the Australasian colonies contain the further requirements that sheep, and other animals, imported from the United Kingdom must be accompanied by a declaration in a prescribed form of their freedom from disease; and that, if found to be healthy on reaching the colony, they shall be placed in quarantine for sixty days at the owners' expense.

* See Foreign Office Report, Miscellaneous Series, No. 369, 1895. Also "The History of the Sheep-breeding Industry in the Argentine Republic," by H. Gibson.

THE ERADICATION OF CHARLOCK.

A most useful discovery has been lately made of the destructive effect of solutions of sulphate of copper and of sulphate of iron upon that ubiquitous and troublesome weed known as "Charlock," "Cadlock," "Kilk," "Yellows," and by other local names. No description of this weed is necessary. All farmers know it, and the difficulty of eradicating it, unfortunately, too well. It is a cruciferous plant, and is termed *Sinapis arvensis*, Linn, or *Brassica sinapistrum*, Boiss. In France it is called *Moutarde des champs*, in Germany *Ackersenf*. Its seeds have a somewhat thick *testa* or outer skin, and, like those of some other weeds and plants, have the power of retaining their vitality for a very long time if light, air, and moisture are withheld from them, and there are many authentic records of the sudden appearance of charlock on land freshly broken up, where the seeds must have been long buried deeply in the ground. Sometimes it suddenly appears in quantities in fields, almost choking the crop and covering the ground with its yellow flowers, although it had not been prevalent there for some seasons. A deeper ploughing than usual, or trenching, has brought the seeds within the reach of oxygen. The utility of sulphate of copper for the destruction of this baneful weed was first discovered in France two years ago by a vine grower, who, having sprayed his vines, noticed that charlock plants growing beneath them were killed by the spray. Experiments were thereupon made in France and Germany on charlock among corn and other plants. These proved satisfactory; and last year trials were made in this country: in Northumberland by Dr. Somerville, of the Durham College of Science; in Essex under the auspices of the Technical Education Committee; and in Lancashire, by

the Technical Instruction Committee, under the direction of Mr. Campbell.

The experiments hitherto made in this country have demonstrated clearly that sulphate of copper and sulphate of iron solutions both kill charlock if made of a certain strength and, at the same time, do not injure the corn plants among which it is growing if they are properly made and carefully applied. In a circular dated November, 1898, Dr. Somerville says:—"There is no doubt that when this new method of destroying charlock is better known, farmers who have infested ground to deal with will obtain spraying machines, or men will be found to take up the work as a commercial venture."

Experiments were made by the Essex Technical Education Committee upon barley about the middle of April, 1898. Several strips of a field of barley were sprayed with one, two, four, and six per cent. solutions of sulphate of copper, in quantities varying from 10 to 100 gallons per acre. A one per cent. solution was found too weak to kill all the charlock; a six per cent. solution on the other hand proved too strong, and damaged the barley. With regard to the quantity to be applied, at the rate of 10 gallons per acre some charlock escaped the spraying, and 100 gallons was found to be far too much. The general outcome of the experiments showed that a two per cent solution applied at the rate of 25 to 50 gallons per acre, during dry weather, and at an early period of growth, was completely successful without injuring the barley. In June the sprayed strips of barley were entirely free from charlock, while adjoining strips unsprayed were yellow with its flowers.

In 1898 similar experiments were conducted under the auspices of the Lancashire Technical Education Committee with sulphate of iron, applied to oats in solutions of 13 to 20 per cent. In the beginning of July one plot of oats was sprayed with a 15 and another with a 20 per cent. solution of sulphate of iron, with the result that in both plots the charlock was quite exterminated and the few thistles were blackened, but the oats and young seeds showed no injurious effects. In the unsprayed plots the charlock had grown

freely. Mr. Campbell says : " The strength of the solutions used, viz., 13, 15, and 20 per cent., are perhaps too strong to risk on a large area, though there was certainly no harm done to the oat crop in these experiments. It would be safer, perhaps, to make the experiment at first on a somewhat smaller scale, and to use a 10 per cent. solution."

Interesting experiments have been carried out at the Agricultural College, Uckfield, under the superintendence of Mr. Malden, the Principal. Twelve plots of oats were sprayed, the oat plants being about five inches high, with a two per cent. solution of sulphate of copper applied at the rate of 25 gallons per acre. It was found that the quantity of liquid was not sufficient, and that 50 gallons per acre of a two per cent. solution was far better, while a dressing of 50 gallons per acre of a one per cent. solution of sulphate of copper also caused a most satisfactory clearance of the charlock. A field of early spring tares, which were not an inch high and nearly smothered by charlock, was sprayed with 25 gallons per acre of a two per cent. solution of sulphate of copper. The charlock, which was also very young, was practically killed off while the tares showed well in the rows afterwards, being quite uninjured. Beans were very much blackened, as might be expected from their soft velvety leaves, but they recovered except where the dressings were heaviest. Other experiments were carried out at Castor, near Peterborough, and elsewhere, also with good results ; and from some of these it was also seen that young seeds sown with oats and barley were not injured by a two per cent. solution of sulphate of copper.

From the results of the experiments referred to above and from other private trials it now seems to be established that sulphate of copper will kill charlock without injury to corn crops or seeds sown with them, tares, and mangels. The strength of the solution should not exceed two per cent., or 2 lbs. to ten gallons of water, at least when the charlock is young and the corn and other plants with which it is growing are young ; and in many cases a one per cent. solution is preferable. The quantity of the solution used per acre should not be less than 25 gallons if it is applied by a

horse distributor; and generally it will be found that more than this quantity is required; but if it is put on with a hand-spraying machine a larger quantity is required, and it is safer to spray at the rate of 40 or 50 gallons per acre, even if the strength of the solution is slightly decreased. Horse distributors spray more evenly and regularly than hand sprayers.

The solution should be applied in fine weather, when there is no prospect of early rain, and it is important to spray before the charlock and the plants among which it is growing are high. The best period to kill charlock is when it is in "rough leaf." When the corn is high the spray cannot reach all the charlock growing among the plants; and a much larger quantity of a stronger solution is required when the charlock is high and in flower than when it is two or three inches high. Two applications of the dressing are recommended, at short intervals.

In experiments made on the 8th of June last, upon charlock in full flower among oats 18 inches high, it was found that a four per cent. solution, that is four pounds of sulphate of copper to every ten gallons of water, applied at the rate of slightly over 50 gallons per acre, did not kill all the flowers. The leaves, being protected to a great extent by the corn plants, were also not sufficiently injured to affect the charlock materially; at the same time the corn plants showed no sign of injury. A six per cent. solution did not quite kill all the flowers, and hurt the blades of the corn plants in some degree.

The greatest care must be taken as to the purity of the sulphate of copper used. It should be accurately weighed, and the solution must be kept well stirred.

Sulphate of copper acts upon charlock because the leaves of this plant are rough, and consequently the solution remains upon them and burns them. The leaves of corn plants are smooth and stand erect so that the solution runs off them. The texture of their leaves is much closer than those of charlock; the leaves of tares and mangels are also smoother than those of charlock. Again, the leaves of the latter plant have comparatively deep furrows by the sides of their midribs and veins in which the solutions settle,

whereas in corn plants, with the parallel or straight venation common in the *Gramineæ*, there are no such deep ribs and veins.

The cost of the dressing is not expensive, the actual solution would not cost more than 1s. to 1s. 3d. per acre; and the ordinary knapsack sprayers can be used by hand, but these do not distribute so evenly as the horse machine. A horse-spraying machine which would do a good many acres in a day can be purchased for about £8.

The effects of the various experiments made with sulphate of iron appear to differ but little from those obtained with the copper sulphate. A larger quantity of the former must be used, from 10 to 14 per cent., but the cost is not greater. The effect of the sulphate of iron is more quickly seen than that of the sulphate of copper, although the actual result cannot be accurately gauged until after two or three days. On the whole, the consensus of opinion is at present slightly in favour of the sulphate of copper. There is, however, much more to be learned with regard to the whole subject: as to the quantities to be used, the stage of growth of the charlock at which the solutions should be put on, and their effect upon the various crops among which the charlock is growing.

BELGIAN AGRICULTURAL CO-OPERATIVE SOCIETIES.

In 1898 a special inquiry was undertaken by the Ministry of Agriculture at Brussels, with the object of ascertaining the number and nature of the co-operative associations of agriculturists existing in Belgium. From the results of this investigation, which have been published in the *Bulletin de l'Agriculture*, it appears that in 1897 there were 1,964 societies organised on co-operative principles in the rural districts of the kingdom. This number included 585 associations for the joint purchase of seeds, manures, and implements, 199 co-operative dairies, 210 apicultural societies, 132 horticultural societies, 71 associations for improving the breeds of cattle, 436 societies for the mutual insurance of live stock, 13 co-operative distilleries, and 172 agricultural credit banks, exclusive of 134 branches affiliated to five central banks.

The syndicates and societies for the purchase of manures, seeds, and implements are constituted in accordance with a law of May 18th, 1873, relating to the formation of commercial societies, and their operations are conducted very much on the lines of the agricultural syndicates of France, an account of which was furnished in an earlier number of this *Journal*.*

The purely co-operative societies for joint purchase differ from the syndicates in one respect, for, while the former merely aim at providing their members with farming requisites at the lowest possible prices, the latter are also commercial enterprises for selling such goods at a profit for the benefit of their shareholders, who are not necessarily farmers. The most important of these syndicates is that of

* Agricultural Co-operative Societies in France (Vol. I, Part I, Page 7).

Landen, established in 1884, with a capital of £12,000. It has numerous branches, and sells manures and other articles not only to its members, but also to non-members, who pay a higher price. Few associations have been organised for the sale and distribution of agricultural produce.

In 1897 the number of members enrolled in the 585 societies and syndicates then existing was 47,206, and the purchases of farming materials made through these organisations amounted in value in the year to £337,500.

Co-operative dairy societies had until recently not made much progress in Belgium, but during the past few years there has been a remarkable increase in their numbers, 87 institutions of this character having been established in the year 1897 alone. At the beginning of 1898 there were 167 dairies in operation, supported by 17,022 co-operating members. An interesting feature of this development is the fact that it has taken place for the most part among the peasant farmers, the average number of cows owned by the co-operators being barely three per member. Butter is the principal product of these societies, and their output of this commodity in 1897 was valued at £355,000, while the value of their sales of cheese, milk, and separated milk was estimated at £10,500.

The published accounts of one of these co-operative dairies situated at Oostcamp, Flanders, show that the average price realised for the butter produced and sold in the year 1897 was 1s. 0½d. per lb. The average price received by the shareholders for the milk supplied by them to the dairy was 3½d. per gallon, but the profits on the working of the year amounted to an additional halfpenny per gallon, while the value of the separated milk returned to the members was calculated to be 1¾d. per gallon. In this society, which is typical of many others, the profits are divided as follows: one-half to the shareholders who hold one share for each cow they keep; one-fourth to the reduction of loan capital; 15 per cent. to the reserve fund; and the remainder is distributed in the form of a bonus to the *employés* of the society. Another interesting example of a Belgian co-operative dairying association is furnished by

the Borsbeke-les-Alost creamery. In this society each member is required to deposit £2 16s. for each cow from which he furnishes milk to the dairy. He is not required to pay the whole sum at once, but may arrange to have it reserved in the form of instalments from the price for the milk delivered. The labour and other expenses are also covered by deducting a small percentage from the price of the milk. Each member receives back his skim milk. The profits from the sale of butter are divided among the members in proportion to the amount of cream furnished by each. The milk is tested with the Babcock apparatus. In 1896 the Borsbeke-les-Alost Society numbered 70 members, owning 150 cows, and the annual profits of the society were estimated to work out to about 56s. per cow.

The co-operative apicultural associations, which numbered 210, with a membership of 8,688 bee-keepers, are, with the exception of 16 of them, grouped in 7 federated societies. Their total receipts in 1897 amounted to £1,000, and their outgoings to £830.

As a type of this form of co-operation, the Apicultural Society of Hainault deserves special mention. It was formed in June, 1890, with 19 sections and 650 members. At present it has 41 branches, and numbers 2,000 members in Hainault, Namur, and Brabant. The work has been developed by theoretical and practical conferences (about 200 a year); by lotteries for the distribution of books, implements, etc.; by the purchase of apicultural materials for members; by the establishment of honey dépôts; and by local and general exhibitions with competitive awards. It has published, *inter alia*, a manual of apiculture, a work on floriculture, two pamphlets on the wintering of bees, one technical and the other popular, and a regular monthly bulletin. The society exchanges publications with similar societies in Belgium and other countries.

In the 132 horticultural societies there were enrolled 17,871 members. The receipts of these bodies amounted in the year to £6,130, and their outgoings to £5,200.

There is a federation of horticultural societies which may be numbered among the official associations, since it was

established under Government auspices. Its object is to promote the progress of different branches of horticulture. The means employed comprise regular meetings of delegates from the societies, the publication of an official journal, and organisation of horticultural conventions and competitions.

The movement for the improvement of the native races of cattle by careful selection of breeding stock is of comparatively recent growth in Belgium, and nearly all the societies formed with this object were founded in 1897. According to the returns collected last year there were 71 of these bodies established by the beginning of 1898, with a gross annual income of £1,250, and their combined lists of members gave a total of 3,945 farmers and stock-raisers. The number of breeding stock inscribed in the herd books of the societies was 10,396.

Societies for the mutual insurance of live stock are common in the rural districts of Belgium. As a rule, cattle are the only animals with which these associations are concerned ; only in a few instances are horses, asses, and sheep also included. The usual compensation allowed to members in the case of the loss of an animal is two-thirds of its value, and this is paid out of the funds of the society, to which all the members make periodical contributions. Another method adopted by some societies is to pay the compensation out of the common fund only when the animal is declared unfit for food ; but if the meat is suitable for human consumption it must be purchased by members of the society, each contributing to the price a sum proportionate to the number of animals he has insured in the society. In some societies there is, however, no common fund, and then the practice is to compensate the owner of a condemned animal by paying him the value of the carcase if the meat has been declared unfit for consumption ; or if the meat may be used for food then the society purchases the carcase from the member at an agreed price.

The greater number of the local cattle insurance societies in the provinces of East Flanders and Limbourg are affiliated to larger insurance societies, which guarantee their stability by means of subsidies. Thus, at the beginning of 1898 there

were 122 co-operative live stock insurance associations affiliated to the East Flanders Insurance Society. These local societies had 13,670 contributing members, and the number of head of cattle insured was 42,340. The sum paid out by the central society as compensation in 1897 amounted in all to over £2,175. The total number of societies for the mutual insurance of live stock existing at the end of 1897 was 436, with 43,086 members, and 119,253 head of cattle were then insured. In addition to the co-operative associations there is, in West Flanders, a system of general and obligatory insurance of live stock, which has been in operation since 1837, providing for compensation in all cases where horses, cattle, asses, and sheep are slaughtered by order of the authorities, and the meat of such animals declared unfit for food. A similar institution was founded in 1892 in the province of Antwerp; but in January, 1896, the principle of obligatory insurance was abandoned in this case. There were in 1898 four local associations for the mutual insurance of horses, in which 349 horses were insured by 234 subscribing members.

The agricultural credit institutions existing in Belgium are of two kinds, viz., agricultural banks (*comptoirs agricoles*), constituted under the law of April 18th, 1884, and co-operative credit associations on the Raiffeisen and Schulze Delitsch system. The former have made little progress in the country, and only seven institutions of this character have been established since 1884. Their business consists for the most part in advancing loans of comparatively large amount to land-owners, and occupiers of large farms.

In 1897 there were in operation in Belgium 158 Raiffeisen credit banks, with 5,689 members. In order to promote the establishment of these banks the Government, by a Law of the 21st June, 1894, authorised the General Savings and Annuity Bank to make advances to Raiffeisen associations upon the security of a central society to which the local associations must be affiliated. The guarantee fund of a central society is usually divided into two portions, one of which consists of annual payments by each local affiliated association, amounting to about one-fourth per cent. on the

loans afforded to its members, the second portion being a sum payable on account. This payment on account is at the disposal of the local bank so long as it continues in operation, but in case of its liquidation or of its dissociation from the central society, the sums paid on account devolve to the latter, which can only utilise the money thus acquired in defraying expenses incurred in the creation of new banks. At the end of 1897 there were five central societies in existence ; but little action had been taken under the Law of 1894 in procuring loans from the General Savings Bank. On the other hand 103 Raiffeisen banks had themselves opened separate banking accounts with the General Savings Bank, and their deposits on current account at the end of the year just mentioned amounted to nearly £31,000. The total amount of the loans advanced in 1897 by the 158 Raiffeisen banks was about £18,700. A more detailed description of the operations of these institutions will be found in an article in this Journal published in June, 1896.* There are now only two co-operative credit societies of the Schulze Delitsch type in Belgium.

Co-operative distilleries may be established in accordance with a Law of 15th April, 1896, and thirteen distilleries were established in 1897, six of which were in operation with a membership of 151 persons last year.

* Vol. III., No. 1, p. 45.

THE RUSSIAN POULTRY AND EGG INDUSTRY.

One of the most noteworthy features of our agricultural trade in late years has been the rapid development in the importation of eggs from Russia. It will be remembered that in 1897 that Empire attained the first place among the contributors to our supply of eggs, so far as regards quantity, although in value the French consignments were still the greater; while last year Russia still further distanced her rivals in this trade, and the total value, as well as the number, derived thence was larger than that from any other country. These facts lend additional interest to the proceedings of the International Congress on Aviculture, recently held at St. Petersburg, and more especially to such papers as deal with the subject from the Russian point of view.

Among these reports one of the most interesting is by M. N. Krioukow, Agronome attached to the Department of Agriculture, who discussed the export trade in avicultural products. The outward commerce of Russia is, owing to the nature of the country, pre-eminently of an agricultural character, some eighty per cent. of the total value representing the produce of rural industry. In view of the importance of the country as an exporter of grain, etc., poultry and its products naturally form only a small percentage of the total; but this percentage has steadily grown during the past decade, so much so that, whereas in 1887 such products amounted to but 2 per cent. (or £1,310,000 out of a grand total of £61,731,000), they had in 1897 reached a value of £3,530,000, or 5 per cent. of the exports, in spite of an increase of over ten millions in the latter. A closer examination of the figures shows, however, that this large increase

is chiefly due to the eggs, which rose from a value of £795,000 in 1887 to £2,550,000 in 1897, and to £3,113,000 in 1898. But the other products of the poultry industry sent out of the country have nevertheless also doubled in value during the period. This increase, it may be noted, has been progressive throughout the period, and cannot be attributed to accidental variations in the seasons.

The export of eggs, which numbered 507 millions in 1887, had increased to 1,831 millions, or by over 250 per cent., in 1898, an augmentation of nearly 500 millions having been recorded in the single year 1895. The great majority are taken by Austria and Germany (92 per cent. in 1887, and 66 per cent. in 1897, going to these two countries), the former until 1896 having usually the largest share. The increase in the exports to Great Britain has, however, been much more rapid than that to the two above-mentioned empires; under 34 million eggs were destined for our ports in 1887, while in 1897 over 377 millions were sent here, the percentage taken by us having risen from 7 to 22. In 1892 Great Britain took 26 per cent. of the Russian eggs exported, the subsequent decline to 19 per cent. in 1894-5 being due, not to a decrease in the shipments here, but to a somewhat sudden augmentation in the trade to Austria and Germany. Nor has the increase in the consignments to this country during the decade been at the expense of the two latter, for they have both largely increased their imports from Russia.

The exportation of live poultry has more than doubled during the period, its value having been £289,000 and £637,000 in 1887 and 1898 respectively. Nearly the whole of it goes to Germany, and the remainder to Austria; the fattening for market takes place after arrival in the country of destination. Dead poultry (which includes game), on the other hand, shows considerable variations, its value having fluctuated during the past decade between £47,500 and £208,000; but there has been a tendency to increase of late years. It goes chiefly to Great Britain, a much smaller quantity being sent to Germany, although a considerable total was at one period taken by the latter. The slaughter

of poultry begins with the cold weather, the great mass being destined for the Christmas market. In the absence of facilities for carriage, it can only be transported during the cold weather, and consignments are often lost through thaws at the commencement of winter.

Down and feathers are exported to the amount of thirty to forty-five thousand cwts., a gradual increase being shown in the last ten years. Nearly the whole quantity goes to Germany and Austria. It is stated that there is no proper machinery for cleaning the feathers in Russia; indeed, all the cleaning and sorting that is done in the country is performed at St. Petersburg, and there only by hand. Machinery for the purpose exists in Germany, and a certain proportion of the feathers are exported thither to be cleaned and then re-imported. The feathers are often carelessly plucked and dirty; the best come from Volhynia, where the business is chiefly in the hands of the Jews, who, when slaughtering the fowls, are careful not to spoil the feathers. The Jewish goods consequently fetch about 24s. to 27s per cwt., whereas the ordinary feathers are only worth 18s. to 21s., and, if very dirty, may go as low as 12s. or 9s. per cwt. Down is much dearer, and costs £6 and more per cwt. The cost of railway transport is the same for down and feathers, and is considered to be almost prohibitive in the case of the latter cheap commodity. Large feathers—goose and swan—are nearly all exported, and most of them find their way to England, where there is a demand for quill pens. They are bought, chiefly at the Nijni Novgorod fair, for about 5d. to 7d. per lb.

From 15,000 to 30,000 cwts. of yolks and whites of eggs are also exported in the course of the year; Germany, Austria, and England, in the order named, taking the principal share.

Domestic fowls in Russia, according to M. Houdekow, who contributed a paper on this subject, are for the most part small and not very productive; and in most cases it is impossible to determine the breed of the birds. There are, however, certain purely Russian breeds, and prominent among these is the Orlov. Good examples of these

fowls are large; a full-grown cock will generally weigh about 9 lbs., and the hen a couple of pounds or so less. In external appearance they somewhat resemble Malay fowls, but anatomically they are very different. The chief point in which they differ from all other kinds is the conformation of the head, which in the Orlov is large and round, while the beak is curved. Crested and bearded fowls known as Pavlovsk also form another distinctive Russian breed; in shape they resemble the Polish crested hens and "Padua" hens, but they are smaller.

There are also in Russia native breeds of geese which have retained their typical character from very ancient times. These geese owe their existence to sport, and are bred, not with a commercial object, but as game birds for fighting; hence they are not remarkable for productivity, thirteen eggs in a season being a common average. These "fighting geese" are very hardy and demand no special feeding or attention, while their meat is of very good quality. The "Tula fighting goose" is the most widely distributed in the central region. The most striking characteristic of this bird is the pretty round head. There are several varieties, varying more particularly in colour and conformation of the beak.

Co-operation appears to be unknown in connection with poultry in Russia, and the industry is described as being everywhere in a more or less backward condition, the country people only raising as much poultry as they are able to maintain without any particular outlay or supervision. The following account of the poultry and egg industry is summarised from a report by the German agricultural expert at St. Petersburg, and published by the German Agricultural Society.* According to this authority progress in the breeding of poultry has not kept pace with the expansion of the export trade. The natural conditions to which the poultry are subjected in different parts of the country have gradually imparted distinctive peculiarities to the breeds. In the northern governments, where little corn is grown, the geese, fowls and ducks, and consequently their eggs,

*Mittheilungen der Deutschen Landwirtschafts Gesellschaft, No. 1, 1898.

are only of inferior quality, for the poultry in winter have to live on chaff and husks of buckwheat or linseed, and in the summer on grass, worms, snails, insects and their larvæ, etc. In the black soil districts, where there is often superabundance and cheapness of grain, the fowls present a much improved appearance. In the non-black soil regions, it is only in well-watered governments, such as Novgorod, Pskov, Vitebsk, and Wologda, that geese and ducks, more especially, thrive, and are often kept. The fowls of the middle and south western districts are fairly large, with larger eggs, and fatten well, and have consequently proved a greater attraction to the small farmer. But even here there are scarcely any signs of "commercial" breeding, although, in consequence of the small local demand, there is always a surplus which in part ultimately finds its way out of the empire.

The principal centres of this trade are St. Petersburg and Moscow. Very few eggs are drawn from Archangel, Finland, or the Baltic provinces; far more come from the territories served by the Nicolaieff and Warsaw railways to St. Petersburg, and by water from the Kazan direction, where Kozlorka forms an important centre for their collection and expedition.

The eggs are usually purchased by dealers going round the villages, payment being made either in cash or kind. The price varies according to quality from 2s. 2d. to 2s. 7d. per 100 in the spring, falling to 1s. 9d. in the summer, but rising again to as much as 4s. 9d. in the autumn. When the dealer has sufficiently laden his cart, he takes the eggs to a merchant on a larger scale, who has a depot near a railway station. Wholesale merchants, especially at St. Petersburg, usually have such depots distributed almost throughout the Empire.

The small dealer buys the eggs, large and small together, just as they are offered, provided they be fresh, and brings them all to the depot, where they are sorted. The first test is the colour of the yolk, which is ascertained by holding the egg up to the light. The yolk is of a reddish hue if the fowls have fed upon natural food, which they have to find for themselves, and which is generally but a poor diet; on the other

hand, the eggs of fowls fed upon corn are of a clear yellow. The first are denominated in Russia "grass" eggs, the latter "grain" eggs. The first are unfit for keeping, and are accordingly sold at once for what they will fetch. Albumen factories are the principal customers for such.

The "grain" eggs, on the other hand, are further sorted, and, according to the result, are destined either for export or for the chief towns. They are examined for (1) freshness and fulness, (2) size, and (3) cleanliness of the shell. The first is observed by the light; the size is determined by a metal ring. Eggs which reach the standard of freshness and fulness and which do not pass through the ring form a special group called "golowka." Not more than about eight of such eggs go to a pound avoirdupois. These are almost all destined for export. The other eggs are again separated into first and second class, and two common sorts, so that there are five grades in the trade. Eggs with broken or merely cracked shells go straight to the albumen factory. The eggs are packed in cases containing 1,440, with dry, clean, oat straw, free from grass.

The largest egg merchants of St. Petersburg lay in, during the autumn, some 30 million eggs each as a winter supply. The large "golowka" eggs are generally at once bought up in St. Petersburg by the foreign agents. Prices there are considerably higher than in the provinces, 4s. 4d. per 100 may be taken as an average, though 6s. 7d. is often given; while with an early Easter and small supply as much as 1s. 9d. for ten eggs may be paid in the retail trade. At the beginning of the second half of November the importation of eggs into the capital ceases almost entirely, for the eggs crack with more than 10 degrees of frost. Only a few consignments are received, in felt-lined waggons, by the Warsaw railway. Some 170 million eggs are annually brought into St. Petersburg by two railways, and another 70 million by water, the greater part of which are consumed in the capital and its immediate neighbourhood.

FARM ANIMALS IN THE UNITED STATES.

A review of the live stock of the United States during the past twenty years, as enumerated by the government of that republic on the 1st January of each year, shows that, while the number of farm animals exhibited an increase, more or less rapid, until, in most cases, about 1892-4, there has set in since that period a decline, affecting all classes. The average value of the animals, as estimated at the same date, on the other hand, exhibited a marked rise during the first five years, followed by a more or less steady decline, the minimum being reached at various dates between 1892 and 1897, since when there has been an appreciable, and in some cases striking, improvement. Speaking very roughly, therefore, and with due regard to exceptions, it may be said that, apart from the first five years, 1880-84, the price has exhibited some tendency to move inversely to the number of the animals in existence.

The changes in the number of oxen and cattle other than milch cows, and the probable significance to be attached thereto, have been dealt with at length in two consular reports by Mr. O'Beirne, of her Majesty's Embassy at Washington, which have already been summarised in this Journal.* It will therefore suffice to recall here that the number of cattle other than milch cows, after a rapid increase in the early eighties, attained a maximum of 37,651,000 head in 1892, when a decline, continuous since 1894, set in, which decline has proceeded at so rapid a rate that the number on 1st January, 1899, was only 27,994,000, representing a loss of 9,657,000 head, or over 25 per cent., in eight years. The

*Vol. III., Dec., 1896, p. 257, and Vol. V., Dec., 1898, p. 343.

value of such cattle rose from £3 7s. per head in 1880 to £4 18s. in 1884; fell steadily to £2 19s. in 1895, and then rose again so fast (particularly in the last two years) that it stood at £4 15s. at the commencement of the present year. This great increase in price brings the total estimated value of all cattle, other than milch cows, in the United States to £132,902,000, a value which had not been reached since 1887.

The number of milch cows has followed a different course. From 12,027,000 in 1880 it rose uninterruptedly to a maximum of 16,505,000 in 1895. There has since been a decline, but it has been very gradual; indeed, the total in 1899, which was slightly better than in 1898, was as much as 15,990,000—*i.e.*, only 515,000, or 3 per cent., below the maximum. The average value of the milch cows, which has throughout the period been something like 30s. per head more than that of "all other cattle," has varied in a very similar manner, having reached a maximum of £6 11s. in 1884, and a minimum of £4 9s. in 1892. The value of both milch cows and oxen, etc., was nearly stationary at a low level from 1890 to 1895. The recovery in the value of milch cows has also been very decided in the last two years, rising by 27s. during the twenty-four months, and the £6 4s. recorded in 1899 is but little below the maximum of the twenty years; in fact, only in the three years 1883-5 has this average value been exceeded. Owing to the much more gradual decline in the numbers, the total value of all the milch cows in the United States on January 1st last amounted to £98,800,000, a total which had never before been approached, the previous highest having been £90,586,000 in 1898, and £88,226,000 in 1884.

In the case of sheep the variations have not been quite so regular. A maximum of 50,627,000 was reached in 1884; after which date there was a decline to 42,599,000 in 1889, followed by a rise to 47,274,000 in 1893, and a further fall to a minimum of 36,819,000 in 1897,—a loss of four million head being recorded between 1895 and 1896. In 1899 the number had risen again to 39,114,000. The average value also shows marked fluctuations. It was given as 9s. 2½d. per head in 1880, and rose to 10s. 6½d. in 1883, it then fell to

7s. 11½d. in 1886, and rose to 11s. 1d. in 1893. In the next two years the value had fallen by 4s. 6d., or 40 per cent., and the 6s. 7d. per head reached in 1895 represents the lowest point touched. Since 1897, however, an almost equally rapid rise has to be recorded, and the value at the commencement of the current year (11s. 5½d.) is the highest of the twenty years. It is somewhat curious that this rapid rise accompanies a slight increase in numbers. These numerous changes in the value per head have subjected the total value of the flocks of the United States to considerable variations; the maximum and minimum of the whole period occur at intervals of only three years, viz., £26,231,000 in 1893, and £13,577,000, or little more than half, in 1896. In 1899 the total value was £22,437,000.

Swine, in number, pursue a more regular course; from 34 millions in 1880 they rose to 52,398,000 in 1892, only to fall again to 38,652,000 in 1899. Neither rise nor fall were, however, uniform, and in some years changes of many million head were shown in the twelve months; for instance, an increase of nearly eight millions is recorded between 1881 and 1882, and nearly six millions between 1888 and 1889, while the number in 1893 was over six millions less than in the preceding year. The fluctuations in the value do not exhibit much regularity; it can only be said that the highest estimate was 28s. 1½d. per head in 1883, and the lowest 17s. 1d. in 1897. The wealth of the United States in swine was greatest, during the past twenty years, in 1893 (£61,547,000) and in 1883 (£60,823,000), and least in 1880 (£30,371,000), when it was just half what it was three years later, an increase of over nine millions in number during that short period having been accompanied by a rise of 10s. 4d. per head. The next lowest total occurred in 1897 (£34,640,000), and in 1899 it was £35,440,000.

The variations in the number of horses and mules have been very similar. Horses reached their maximum (16,207,000) in 1893, and have since fallen to 13,665,000; while the greatest number of mules was noted in 1894 (2,352,000). Values have pursued a different course. The decline in the case of these animals occurred almost entirely in the two

years 1893-5; there had been a sharp rise from 1880 to 1884; but the decline in the next ten years, although practically continuous, was very gradual, while the recovery since the minimum in 1897 has been only slight. Horses were estimated at their highest value (£15 11s. per head) in 1884, the lowest being £6 11s. in 1897. So sharp was the fall that the value in the last mentioned year was less than half what it was five years previously; the chief drop being from £12 15s. in 1893 to £9 19s. in 1894 and £7 11s. in 1895. In the case of mules, the maximum, £17 11s., occurred in 1884, and the heaviest fall in any one year was from £12 19s. in 1894 to £9 18s. in 1895. Mules, it may be noted, are usually put at from 30s. to 40s. more than horses. The total value of all the horses, which had been as high as £209,915,000 in 1892, was only £106,474,000 in 1899. Mules, estimated at about £38,000,000 in 1890, were only £19,992,000 at the beginning of the present year.

The two following summary tables exhibit the estimated number and value per head of farm animals in the Republic at different dates during the past twenty years, as given in the Year-book of the United States Department of Agriculture :—

YEAR.	CATTLE OTHER THAN MILCH COWS.		MILCH COWS.		SHEEP.	
	Number.	Value.	Number.	Value.	Number.	Value.
		£ s.		£ s.		s. d.
1880	21,231,000	3 7	12,027,000	4 17	40,765,900	9 3
1885	29,866,573	4 17	13,904,722	6 4	50,360,243	8 11
1890	36,849,024	3 3	15,952,883	4 12	44,336,072	9 6
1895	34,364,216	2 19	16,504,629	4 12	42,294,064	6 7
1897	30,508,408	3 9	15,941,727	4 17	36,818,643	7 7
1899	27,994,225	4 15	15,990,115	6 4	39,114,453	11 6

YEAR.	SWINE.		HORSES.		MULES.	
	Number.	Value.	Number.	Value.	Number.	Value.
		s. d.		£ s.		£ s.
1880	34,034,100	17 10	11,201,800	11 8	1,729,500	12 15
1885	45,142,657	20 11	11,564,572	15 7	1,972,569	17 3
1890	51,602,780	19 8	14,213,837	14 7	2,331,027	16 6
1895	44,165,716	20 9	15,893,318	7 11	2,333,108	9 18
1897	40,600,276	17 1	14,364,667	6 11	2,215,654	8 14
1899	38,651,631	18 4	13,665,307	7 16	2,134,213	9 7

Considering the value of all these animals as a whole, it appears therefore that the total value of farm animals in the United States was estimated to have increased from £328,524,000 in 1880 to £522,302,000 in 1889, and to have suffered a diminution, as compared with the latter year, of nearly £180,000,000 by 1897, when the total was again reduced to £344,878,000. In 1899, however, the value had risen once more to £416,044,000.

EXPERIMENTS IN THE SEEDING OF SAINFOIN AND LUCERNE.

A report has recently been transmitted to the Board by the Director of the Agricultural Department of Reading College, furnishing the results of the field experimental work conducted under the supervision of the College during 1898. Among the experiments of the past year were some relating to the seeding of sainfoin and lucerne. These were carried out in the counties of Dorset and Oxfordshire, with a view to the determination of the following points, viz., the relative values of sainfoin and lucerne; the effect of sowing these seeds broadcast and by the drill; and the relative results obtained by sowing them alone or mixed with grass and clover seeds.

In Dorset the experiments were made on a farm at Shillingstone, near Blandford. The soil is a chalky loam, varying from five to twelve inches in depth, the subsoil being chalk. In 1896 the field was under turnips, manured with two cwt. superphosphate, two cwt. dissolved bones, and one ton couch ashes per acre; the turnips were fed off with sheep. The plots were each $\frac{1}{4}$ -acre in area. The seeds were sown with barley at the end of March, 1897. A narrow strip at the end of each plot was not sown with barley, so that the result of sowing the various seed mixtures without a crop might be noticed.

The plots were inspected on September 28th, 1897, some time after the barley had been harvested. At that time all the plots looked well; the narrow strip on which barley had not been sown was very luxuriant, but the remaining portions of the plot had plenty of plant. The drilled plots of sainfoin and lucerne differed very little from those sown broadcast,

owing to the drills being so narrow that the seeds were nearly as much scattered as where they were broadcasted.

At the end of December, 1897, three cross-plots, each $\frac{1}{4}$ acre in area, were marked off and manured as follows:—Cross-plot 1 (at the end farthest from the hedge) no manure; Cross-plot 2, three cwt. kainit per acre; Cross-plot 3, three cwt. kainit and three cwt. superphosphate per acre; Cross plot 4, one cwt. bone compound.

The results of the experiments at Shillingstone are shown in the following Table:—

Plot	Seeds per Acre.	Cost of Seeds per Acre.	Weight of Herbage (green) per Acre			
			Cross-plot 1.	Cross-plot 2	Cross-plot 3.	Cross-plot 4.
1	30 lb. Lucerne (broadcast) -	£ s. d. 1 5 0	tons cwt. lb. 0 12 96	tons cwt. lb. 0 19 32	tons cwt. lb. 1 5 80	tons cwt. lb. 0 18 24
2	20lb. Lucerne (drilled) -	0 16 8	0 15 0	0 15 0	0 18 24	0 12 96
3	*40lb. Lucerne Mixture (broadcast) -	1 1 0	1 11 8	1 11 8	1 10 0	1 5 80
4	95 lb. Sainfoin in the husk (broadcast)	1 11 8	1 16 48	1 14 32	1 1 48	1 5 8
5	70lb. Sainfoin in the husk (drilled)	1 3 4	1 12 16	1 12 16	1 10 0	0 19 56
6	†58lb. Sainfoin Mixture (broadcast) -	1 2 6	2 12 56	2 2 96	2 7 16	1 16 48

* The lucerne mixture was 10lb. lucerne, 10lb. sainfoin in the husk, 2lb. cocksfoot, 2lb. Timothy, 2lb. tall fescue, 1lb. trefoil, 2lb. alsike, 1lb. cowgrass, and 10lb. perennial ryegrass.

† The sainfoin mixture was 35lb. sainfoin in the husk, 3lb. lucerne, 2lb. cocksfoot, 2lb. Timothy, 2lb. tall fescue, 1lb. trefoil, 2lb. alsike, 1lb. cowgrass, and 10lb. perennial ryegrass. Old English common sainfoin has been sown, as this stands much longer than giant sainfoin. The rest of the field has been sown with common sainfoin.

The results show that in the first year, both with lucerne and sainfoin, considerably heavier crops are got by sowing grasses and clovers with these plants than by sowing them by themselves.

The following notes were made on the plots on May 27th, 1898:—

The lucerne on plots 1 and 2 was a poor plant and very thin at bottom, especially where no manure had been applied;

while weeds, such as charlock, campions and brome grasses, were abundant. Plot 1 was rather better than plot 2. The herbage on plot 3 (the lucerne mixture) was very good; there were no weeds, and there was a fair sprinkling of sainfoin; the lucerne plant, however, was rather weak, but the crop was a satisfactory one. Sainfoin on plots 4 and 5 was poorly developed; on the unmanured portions of the plots weeds, such as campions and thistles, were abundant, and also rough stalked meadow grass; on the manured portions of the plots the sainfoin formed a thick close covering, and was at that time in flower. The sainfoin mixture on plot 6 was the heaviest crop, and very few weeds were present; perennial ryegrass was the most prominent grass, although all the others sown were represented; there was a fair sprinkling of sainfoin, but scarcely any lucerne.

The aftermath, or second crop, was a small one, and the sainfoin and lucerne mixtures were thickest in the bottom, and stood the drought much better than did the other plots. The lucerne grew most strongly in the aftermath, but was not as luxuriant as one would expect.

In Oxfordshire the experiments were begun in the spring of 1896 on land at Kidmore Grange, Caversham, where they have been continued each year since. The points to be determined are the same as in the case of the Dorset experiments; but an additional object of the Oxfordshire experiments is to test the relative results of sowing sainfoin and lucerne with and without a corn crop, as well as mixed with grass and clover seeds.

At Kidmore Grange the plots are close to the road, and lie to the right, going north past the farm buildings, about 150 yards from the buildings. The soil is a dry, gravelly loam, of varying depth, and rests on chalk. The land was cropped with wheat in 1895, except a narrow strip along the edge of plots 1 to 10, which was in vetches; in 1894 the crop was clover. Each of the twelve plots is $\frac{1}{4}$ acre in area. All the seeds were sown during the first week of May, 1896. On plots 1 to 6 the seeds were sown with oats, which, owing to the dry summer, were a light crop. On plots 7 to 12 the seeds were sown without a crop.

The estimated results of the experiments are given in the Table below :—

Plot.	Seeds per Acre.	Cost of Seeds per Acre.	Estimated Weight of Hay per Acre.	
			June 12th, 1897.	June 13th, 1898.
		£ s. d.	tons cwt. lb.	tons. cwt lb.
1	30 lb. Lucerne (broadcast) -	1 5 0	1 5 0	1 15 0
2	20 lb. Lucerne (drilled) -	0 16 8	1 5 0	1 15 0
3*	40 lb. Lucerne mixture (broadcast) -	1 1 0	2 0 0	2 2 0
4	95 lb. Sainfoin in the husk (broadcast) -	1 11 8	0 15 0	1 16 0
5	70 lb. Sainfoin in the husk (drilled) -	1 3 4	1 0 0	1 18 0
6†	58 lb. Sainfoin mixture (broadcast) -	1 2 6	2 2 0	2 0 0
7	30 lb. Lucerne (broadcast) -	1 5 0	1 12 0	1 14 0
8	20 lb. Lucerne (drilled) -	0 16 8	1 10 0	1 16 0
9*	40 lb. Lucerne mixture (broadcast) -	1 1 0	1 15 0	1 15 0
10	95 lb. Sainfoin in the husk (broadcast) -	1 11 8	2 7 56	1 12 0
11	70 lb. Sainfoin in the husk (drilled) -	1 3 4	2 0 0	1 15 0
12†	58 lb. Sainfoin mixture (broadcast) -	1 2 6	1 14 0	1 15 0

* The lucerne mixture was 10 lb. lucerne, 10 lb. sainfoin in the husk, 2 lb. cocksfoot, 2 lb. Timothy, 2 lb. tall fescue, 1 lb. trefoil, 2 lb. alsike, 1 lb. cowgrass, and 10 lb. perennial ryegrass.

† The sainfoin mixture was 35 lb. sainfoin in the husk, 3 lb. lucerne, 2 lb. cocksfoot, 2 lb. Timothy, 2 lb. tall fescue, 1 lb. trefoil, 2 lb. alsike, 1 lb. cowgrass, and 10 lb. perennial ryegrass. Old English common sainfoin has been sown, as this stands much longer than giant sainfoin.

The following notes relate the appearance of the plots on June 12th, 1897 :—

Plots 1 and 2 would not be ready for cutting till a fortnight later, when the crop would probably be heavier; an abundance of lucerne was present. Plot 3 would be ready for cutting a week later; here there was a fair amount of lucerne with an abundance of perennial ryegrass and trefoil, but only a few strong plants of sainfoin; it was a good hay mixture. Plots 4. and 5 were ready for cutting; these were very small crops with few sainfoin plants. Plot 6 was

ready for cutting; this was an excellent hay mixture and a heavy crop. The results were very similar on plots 7-12 as on the corresponding plots, but on the plots sown with a crop grass seeds grew best; whereas lucerne, and especially sainfoin, did much better on the plots sown without a crop.

On October 6th, 1897, the aftermath on plots 1 and 2 was good, 2 being rather better than 1; the same remark applied to plot 3; on plots 4 and 5 the aftermath was very deficient; the plant on plot 5 was good, but on plot 4 was patchy; on plot 6 there was a fair amount of herbage, lucerne being present in much more abundance than sainfoin; on plots 7 and 8 there was a heavy crop of aftermath, with plenty of lucerne plant; on plot 9 the aftermath was fair; on plots 10 and 11 the sainfoin plant was rather patchy, and there was very little aftermath; and on plot 12 there was a fair amount of aftermath in which lucerne was prominent.

The following notes on the appearance of the plots were made on June 13th, 1898:—

Plots 1 and 2 would be ready for cutting in a week, and brome grass, Italian ryegrass, and weeds were present in abundance. On plot 3 the hay was of best quality and free from weeds. The crop covered the ground well, a few sainfoin plants being present and much cowgrass. Plots 4 and 5 were ready for mowing four days before; they were rather weedy, with much brome grass present. Plot 6 was growing hay of excellent quality, just ready for cutting, all the seeds in the mixture being well represented. On plots 7-12 the appearances were somewhat the same as on plots 1-6, but in most cases the crop appeared to be rather lighter.

The general conclusions derived from the Oxfordshire experiments are as follows:—

The plots sown with a crop were, on the whole, much better than those sown without a crop, and were freer from weeds. Where drilled and hoed afterwards a smaller amount of seed had, as a rule, given a better plant. So far as the experiments have gone, lucerne seems to be distinctly ahead of sainfoin; the sainfoin is as good for the first crop of hay, but is weak for the aftermath. The lucerne and sainfoin

mixtures have kept the land clean, and last year gave well-mixed hay of excellent quality. Plots 1-10, on the parts where wheat was grown in 1895, were much better than where vetches were grown in that year. The sainfoin was ready for mowing about a week earlier than ordinary hay, and the lucerne rather later. The seed-mixtures sown on plots 3 and 9 were evidently suitable for this land for at least two crops of hay in succession.

EXPERIMENTS IN THE GROWTH OF SUGAR BEETROOT IN GREAT BRITAIN.

The Board of Agriculture have received from the Central Chamber of Agriculture a report embodying a series of statements, laid before the Council of that body on the 30th of May last, by a Special Committee, as to the results of experiments in the growth of sugar beetroot, carried out in various localities in Great Britain during the season of 1898.

These experiments were originally brought under the notice of the Central Chamber in 1898 by Colonel Victor Milward, M.P., and the Board of Agriculture were subsequently invited to undertake direct official cognisance of the experiments and control the analysis of the beets grown. The Board did not consider it necessary themselves to undertake any experiments of this nature, inasmuch as they saw no reason to doubt the correctness of the view they had already expressed, viz., that in certain districts, and in seasons when the climatic and other conditions were especially favourable for its growth, sugar-beet might be cultivated with advantage provided the prices which could be obtained for the produce were satisfactory.

The Board, however, undertook, in the event of any further experiments being instituted, to give the Council any advice or assistance in their power as to the form of records which might be adopted under the circumstances, and eventually to consider how far they could assist in giving publicity to the results of any new experiments.

The Special Committee of the Council of the Chamber of Agriculture have now reported that they thereupon addressed to 400 of the intending experimenters a form of enquiry embodying the particulars desired of the experiments made during the past season. Replies to their circular

were received in 143 instances. Many of these, however, proved to be experiments conducted on very small plots of land, and it was only in cases, where the surface under experiment was not less than a quarter of an acre, that further details were requested as to results.

The Committee obtained this further information from 65 persons, who furnished particulars as regards 77 separate plots sown with beetroot in 1898, in thirty counties in Great Britain. In 13 cases the crops were returned as failures, attributed mainly to excessive drought. In 17 other instances the information furnished was defective as regards the weight of the crop or the analysis of the roots.

As regards the system of cultivation, the date of sowing, the quantity of seed sown, and the method of lifting pursued by the experimenters the Committee state that the operations usual in the case of mangolds, such as ploughing, working, rolling, horse and hand hoeing, etc., were applied to the cultivation of the beetroot; the date of sowing was from the latter end of April to the beginning of May; the quantity of seed sown was about 8 or 10 lbs. per acre; and in lifting, the roots were either forked, hand-pulled, or spade-dug. In some cases, owing to the extreme hardness of the ground, the pickaxe had to be employed.

The information which was furnished in reply to the questions put to the experimenters respecting the cost of growing the beetroot was not quite uniform in scope or complete in form; but the Committee state that while it showed the cost of growing sugar beet and mangold to be approximately the same, it may be regarded as certain that the cost of growing the former is more than that of growing mangold in respect of at least two items—viz., the cleaning of the land and the lifting and the cleaning of the roots.

The unusual meteorological conditions which prevailed last year are duly mentioned by the Committee, who state:—"It should be noted that the season of 1898 was of an exceptional character and probably favourable to the growth of sugar-beet, although in many districts there was a drought which practically killed the plants. Very cold weather was experienced during May and June, but during the important

months of July and August the rainfall of the kingdom was considerably less, and the period of bright sunshine was more, than the average."

The year was one in which the yield of mangolds in Great Britain as a whole was 17.65 tons per acre according to the official produce statistics. This was nearly a third of a ton per acre over the average. The mean yield of sugar-beet on the plots enumerated in the accompanying tables is 24.2 tons with leaf and 16.3 tons without leaf. The growers of these experimental crops state their estimated yields of mangolds in the same season at figures which in only three cases fall below twenty tons, and range from that estimate to over forty, and in a single instance as high as sixty tons, the average mangold production of the experimenters being 26.2 tons per acre.

In the following tables the counties are arranged in the geographical divisions adopted in the Agricultural Returns. Table I. shows the area sown with sugar beetroot, together with the yield and other particulars relating to the cultivation and treatment of the crop. Table II. shows the results of the examinations of the beets supplied to the analysts by the growers. The reference numbers in Table II. apply to the experimenters and crops bearing the same numbers in Table I.

From Table II. it will be seen that the average quantity of sugar in 100 parts of the juice, as reported by the analysts who examined the samples, works out to 15.65; that the average quotient of purity was 85.19; and that the average quantity of sugar in 100 parts of the roots was 14.48.

TABLE I.—ACREAGE, SOIL, CULTIVATION AND BY CERTAIN EXPERIMENTERS IN GREAT

Reference Number	County.	Name of Experimenter.	Acreage planted with Beet.	Soil.	Sub-soil.
England:—			Acres.		
1	Essex -	Turner, H. - - -	$\frac{1}{4}$	Chalky clay	Clay - - -
2	Lincoln -	Smith, E. Sydney -	$\frac{1}{4}$	Loam - -	Silt - - -
3	Do. -	Staples, J. - - -	$\frac{1}{4}$	Sand - -	Clay - - -
4	Do. -	Woolston, J. - - -	$1\frac{1}{2}$	Medium light	Clay, limestone -
5	Middlesex -	Edmonton Sewage Farm	$\frac{1}{4}$	Clay - -	Clay - - -
6	Norfolk -	Nash, F. S. - - -	$\frac{1}{4}$	Strong loam	Clay - - -
7	Do. -	Tuddenham, R. W. -	$\frac{1}{4}$	Loam - -	Clay - - -
8	Hants -	Clyma, J. - - -	$\frac{1}{2}$	Clay and loam	Gravel - - -
9	Do. -	Moens, W. J. C. -	Perches. 27	Loamy sand, no lime	Sand - - -
10	Do. -	Do. - - -	40	Do. - -	Do. - - -
11	Do. -	Do. - - -	7	Loamy sand	Sand - - -
12	Do. -	Do. - - -	27	Clayey loam	Clay over sand -
13	Do. -	Do. - - -	46	Do. - -	Do. - - -
14	Do. -	Do. - - -	47	Do. - -	Do. - - -
15	Do. -	Do. - - -	22	Light sandy loam	Red gravel - -
16	Do. -	Do. - - -	24	Do. - -	Do. - - -
17	Do. -	Do. - - -	50	Do. - -	Do. - - -
18	Do. -	Wills, S. - - -	Acres. $\frac{1}{4}$	Loamy clay	Clay - - -
19	Kent -	Capeling, George -	$\frac{1}{4}$	Sandy loam	Sandy clay - -
20	Do. -	S. E. Agr. College -	1	Loam - -	Chalk - - -
21	Do. -	Tomkin, B. H. - -	$\frac{1}{4}$	Sandy and sandy loam	Gravel - - -
22	Leicester	Slatter, George - -	$\frac{1}{4}$	Loamy - -	Gravel - - -
23	Warwick	Armstrong, W. - -	$\frac{1}{4}$	Loam and gravel	Clay and clay gravel -
24	Do. -	Blake, E. T. - - -	R. P. V. 1 26 4	Loam - -	Clay and gravel -
25	Do. -	Fellows, W. - - -	Acres. $\frac{1}{4}$	Loam - -	Gravel - - -
26	Do. -	Muckleston, Rev. E. -	$\frac{1}{2}$	Sand - -	Sand and gravel -

TREATMENT, AND YIELD OF SUGAR BEET, GROWN IN GREAT BRITAIN DURING THE SEASON OF 1898.

Previous Cropping.	Cultivation and Treatment.	Yield of Beet per Acre.		Reference Number.
		With Tops.	Without Tops.	
Fallow, barley - - -	10 loads dung, 4 cwts. superphosphate per acre - - -	9	8	1
Spring cabbage, man- gold	18 loads dung per acre ; 4 cwts. superphosphate per acre	49½	17	2
Oats - - - - -	5 cwts. artificial potato manure per acre - - -	—	24	3
(1) Linseed, clover, (2) Wheat, oats, (3) Bar- ley, barley	Dung, dry closet manure, and burnt ashes, turnip guano.	18	14	4
Mangold, cabbage- -	Sewage applied December, 1897; and February, 1898	—	20	5
Mangold, wheat - -	12 loads dung per acre - - - - -	22	20	6
Hay, wheat - - -	15 tons dung per acre ; 4 cwts guano and 3 cwts damaged malt culms	19½	13½	7
Barley, hay - - -	Dung, March, 28 lbs. nitrate of soda, 1 cwt of dissolved bones, May 1st	25	20	8
Red Silesian cattle sugar beet	24 loads of dung per acre (April) ; mixture of 2 cwts of sulphate of ammonia, 4 cwts of dissolved bones ; 1 cwt chloride of sodium, 8 cwts of gypsum—applied at the rate of 4 cwts per acre before last harrowing	27½	16	9
Do. potatoes, rye - -	Do. Do. Do.	23½	18½	10
Red Silesian cattle beet	Do. Do. except mixture applied at the rate of 6 cwts per acre	30½	19½	11
Do. Do.	Do. Do. except mixture applied at the rate of 8 cwts per acre	26½	16½	12
Do. Do.	Do. Do. except mixture applied at the rate of 7 cwts per acre	29	20	13
Do. Do.	Do. Do. except mixture applied at the rate of 8 cwts per acre	27½	17	14
Do. Do.	Do. Do. except mixture applied at the rate of 6 cwts per acre	17½	14	15
Do. Do.	Do. Do. Do. Do.	23½	12½	16
Do. Do.	Do. Do. Do. Do.	19½	13½	17
Oats, vetches - - -	8 loads pig and horse dung mixed - - - -	47	40	18
Beans, potatoes - -	30 loads dung per acre Nov. 10 ; 4 cwts. rape dust at seed time	32	25	19
Swedes, barley - -	15 loads dung ; 2 cwts. superphosphate, 1 cwt. salt, 1 cwt. kainit, 2 cwts. nitrate of soda	19½	14	20
Mangold, oats - -	40 loads of dung per acre - - - - -	15	13½	21
Clover, wheat - -	20 tons stable dung per acre at Xmas - - -	20	15½	22
Barley, peas - - -	1½ cwt. sulphate of ammonia, and 4 cwts. superphosphate per acre	15	12½	23
Peas, oats - - -	4 cwts. kainit, 4 cwts. mangold manure, broadcast April 27th ; 3 cwts. superphosphate in row, 2 cwts. nitrate blast, May 10th ; 1 cwt. nitrate, July 23.	30	20	24
Potatoes, mangold -	Night soil applied in autumn ; stable dung, 18 tons per acre, ploughed in at Xmas	36	18	25
Potatoes - - -	10 loads dung per acre, 5 cwts. brod salt per acre -	23	10	26

TABLE I.—ACREAGE, SOIL, CULTIVATION AND TREATMENT, MENTERS IN GREAT BRITAIN DURING

Reference Number.	County.	Name of Experimenter.	Acreage planted with Beet.	Soil.	Sub-soil.
England.—			Acres.		
27	Cornwall	Hoblyn, W. P. - -	$\frac{1}{4}$	Clayey loam	Clay - - - -
28	Salop	Adshead, J. W. - -	$\frac{1}{2}$	Strong loam	Rotch and gravel -
29	Do.	Arden, W. - - -	$\frac{1}{2}$	Loam - -	Sand - - - -
30	Do.	Danford, W. L. - -	$\frac{1}{4}$	Strong loam	Gravel and clay -
31	Do.	Dyas, A. B. - - -	$\frac{1}{4}$	Stiff clay	Clay - - - -
32	Do.	Edwards, R. S. - -	$\frac{1}{4}$	Clay and loam	Clay - - - -
33	Do.	Galbraith, Peter - -	$\frac{1}{4}$	Sandy loam	Gravel - - - -
34	Division III.	Hollis, J. - - -	$\frac{1}{4}$	Loam - -	—
35		Rider, E. - - -	1	Light sandy loam	Gravel and sand -
36		Wilkinson, A. and H. -		Loam - -	Clay - - - -
37		Gooding, T. - - -	$\frac{1}{4}$	Loam - -	Peat - - - -
38	Wilts	Holloway, W. - - -	$\frac{1}{4}$	Sand - -	Clay - - - -
39	Do.	Lawrence, W. F.; M.P.	$\frac{1}{2}$	Light on chalk	Chalk - - - -
40	Do.	Do. Do.	1	Light sandy	Sand - - - -
41	Worcester	Hutchinson, B. - -	$\frac{1}{2}$	Brashy sandy loam - -	Gravel - - - -
42	IV. Cheshire	Williamson, J. B. - -	$\frac{1}{4}$	Loam - -	Clay - - - -
43	Cumberland	Shanks, R. - - -	$\frac{1}{4}$	Loam - -	Gravel on limestone -
Wales:—					
44	Flint	Taylor, H. - - -	$\frac{1}{4}$	Sandy - -	—
Scotland:—					
45	Aberdeen	Ironside, R. - - -	$\frac{1}{4}$	Alluvial - -	Alluvial - - -
46	Do.	Strachan, L. - - -	$\frac{1}{4}$	Sandy loam -	Sandy loam - -
47	Ayr.	Logan, John - - -	$\frac{1}{4}$	Sand and heavy loam	Sand and gravel -

AND YIELD OF SUGAR-BEET, GROWN BY CERTAIN EXPERI-
THE SEASON OF 1898.—*continued.*

Previous Cropping.	Cultivation and Treatment.	Yield of Beet per Acre.		Reference Numbers.
		With Tops.	Without Tops.	
		Tons.	Tons.	
Grass - - -	Ploughed and subsoiled ; 4 cwts. superphosphate, 3 cwts. kainit ; 2½ cwts. nitrate of soda per acre-	28	18	27
Clover, wheat- - -	Dung ; 4½ cwts. dissolved bones - - - -	13	11½	28
Clover, wheat- - -	Dung ploughed in, January ; 2½ cwts. guano - -	40	30	29
Clover-lea, wheat, oats -	Dung ; 2 cwts. ground bones, 1½ cwt. superphosphate	20	13½	30
Peas, wheat - - -	15 tons dung per acre ; 4 cwt. superphosphate, 1 cwt. nitrate at sowing	20½	11½	31
Wheat, barley - - -	Mangold manure - - - - -	21	14	32
Clover, wheat- - -	15 tons dung ploughed in in the Autumn, 4 cwts. superphosphate and bone meal, and 1 cwt. of nitrate at sowing	20	18	33
Barley, oats - - -	Dung and nitrate of soda - - - - -	26	17	34
1896: 4-year old ley, 1897: turnips eaten off by sheep	4 cwts. per acre of mangold manure - - - -	22	14¾	35
Roots, oats - - -	15 tons dung ; 2 cwts. superphosphate, 4 cwts. dissolved bones	22	—	36
Mangold - - -	Dung only - - - - -	36	24	37
Grass - - -	Dung, 12 tons per acre - - - - -	20	16	38
Lucerne, oats - - -	Dung, 10 cwts. ; sulphate of ammonia, 1½ cwt., guano 2 cwts.	12	8	39
Swedes, oats - - -	Dung in Autumn, 1 cwt. sulphate of ammonia, 2 cwts. guano, 1 cwt. bones.	15½	10	40
Potatoes, oats - - -	10 tons dung in Autumn ; 5 cwts. superphosphate per acre in April	16	10	41
Oats, potatoes - - -	Lime, 2 tons per acre ; dung, 15 tons per acre -	40	18	42
Hay, oats - - -	15 tons dung per acre ; 5 cwts. superphosphate and 10 cwts. potash.	17½	13½	43
Oats - - -	Dung and superphosphate- - - - -	—	1	44
Pasture grass - - -	Dung, 16 tons per acre ; kainit, 8 cwts. per acre -	16	8	45
Grass, oats. - - -	15 loads dung per acre, 3 cwts. artificial manure mixture.	19	12	46
Oats, grass - - -	2 cwts. sulphate of potash, 1 cwt. ammonia, 4 cwts. superphosphate in April ; 1 cwt. nitrate in June.	32	16	47

TABLE II.—RESULTS OF ANALYSES OF

Reference Number.	County.	Variety of Seed.	Average Weight of Roots.		Degrees Brix (Dry Matter).
			With leaves.	Without leaves.	
	ENGLAND :—		lbs.	lbs.	
1	Division I.	Essex - - - - Schreiber - - -	3'59	2'08	20'90
		Do. - - - - Vilmorin - - -	3'13	1'87	19'40
2		Lincoln - - - - Schreiber - - -	4'37	2'08	20'40
		Do. - - - - Vilmorin - - -	3'00	1'51	18'20
3		Do. - - - - Mette Wanzleben - - -	4'02	2'46	16'80
4		Do. - - - - Do. - - - -	3'85	2'06	16'30
		Do. - - - - Own old Seed - - -	2'08	1'26	17'40
5		Middlesex - - - - Schreiber - - -	5'99	3'41	16'20
6		Norfolk - - - - Do. - - - -	4'78	3'66	20'50
		Do. - - - - Vilmorin - - -	4'28	2'26	21'66
7		Do. - - - - Schreiber - - -	4'17	2'72	20'20
		Do. - - - - Vilmorin - - -	3'65	2'18	19'10
8		Hants - - - - Wanzleben - - -	4'31	3'33	17'73
		Do. - - - - Vilmorin - - -	3'13	2'32	19'28
9		Do. - - - - Wanzleben - - -	2'49	1'85	18'77
10		Do. - - - - Vilmorin - - -	3'62	2'47	18'07
11		Do. - - - - "Richest of All" - - -	—	2'31	17'90
12		Do. - - - - Schreiber - - -	2'70	1'64	17'90
13		Do. - - - - Wanzleben - - -	2'62	1'83	18'97
14	Division II.	Do. - - - - Red Silesian - - -	3'62	2'16	17'30
15		Do. - - - - Schreiber - - -	2'53	1'79	16'10
16		Do. - - - - Klein - - - -	2'31	1'44	19'10
17		Do. - - - - Simon Legrand - - -	2'30	2'04	20'00
18		Do. - - - - French and German, mixed - - -	—	1'63	16'01
19		Kent - - - - Schreiber - - -	10'74	6'94	15'90
		Do. - - - - Mette Wanzleben - - -	7'72	4'33	14'90
20		Do. - - - - Schreiber - - -	2'38	1'64	22'40
		Do. - - - - Mette Wanzleben - - -	2'09	1'35	18'60
		Do. - - - - Brenstedt - - -	3'41	1'97	21'00
		Do. - - - - Schlieckmann - - -	2'94	1'59	19'40
		Do. - - - - Janasz - - - -	1'87	1'17	20'70
		Do. - - - - Simon Le Grand - - -	1'98	1'17	21'40
21		Do. - - - - Janasz - - - -	2'31	1'40	16'80
		Do. - - - - Simon Le Grand - - -	2'03	1'28	18'30
22		Leicester - - - - Brenstedt - - -	3'79	2'08	17'30
23		Warwick - - - - Vilmorin - - -	3'63	2'37	18'80
24		Do. - - - - Schreiber - - -	3'41	2'08	20'20
		Do. - - - - Mette Wanzleben - - -	4'06	2'48	19'40
		Do. - - - - Vilmorin - - -	3'59	2'22	18'90
		Do. - - - - Mette Vilmorin - - -	3'19	2'26	19'70
25		Do. - - - - Vilmorin - - -	3'06	1'54	16'55
26		Do. - - - - German - - - -	4'10	2'22	15'80
		Do. - - - - French - - - -	4'55	2'48	16'00

SPECIMEN ROOTS, GROWN BY EXPERIMENTERS.

Specific Gravity.	Quantity of Sugar in 100 parts of the juice.	Quantity of Non-Sugar in 100 parts of the juice.	Quotient of Purity.	Quantity of Sugar in 100 parts of the Roots.	Analysed by	Reference Number.
1'087	18'30	2'60	87'56	17'40	S. Stein	1
1'087	17'20	2'20	88'65	16'50	Do.	
1'085	17'80	2'60	87'25	16'90	Do.	2
1'075	15'60	2'60	85'71	14'70	Do.	
1'069	14'40	2'40	85'71	13'80	Do.	3
1'067	13'70	2'60	84'05	13'20	Do.	4
1'072	15'00	2'40	86'15	14'40	Do.	
1'067	13'80	2'40	85'18	13'10	Do.	5
1'086	17'60	2'90	85'85	17'00	Do.	6
1'090	18'60	3'00	86'11	17'80	Do.	
1'084	18'00	2'20	89'10	17'10	Do.	7
1'079	16'80	2'30	87'95	16'00	Do.	
1'073	14'55	3'18	82'06	13'15	H. Tate and Sons	8
1'080	15'78	3'50	81'85	13'90	Do.	
1'077	15'53	3'24	82'74	14'40	Do.	9
1'074	14'48	3'59	80'13	12'55	Do.	10
1'074	15'80	2'10	88'26	15'20	S. Stein	11
1'074	15'80	2'10	88'26	15'30	Do.	12
1'078	15'73	3'24	82'92	14'05	H. Tate and Sons	13
1'071	14'70	2'60	84'85	13'90	S. Stein	14
1'066	13'70	2'40	85'09	13'10	Do.	15
1'079	16'10	3'00	84'28	15'50	Do.	16
1'083	17'90	2'10	89'50	17'20	Do.	17
1'065	13'68	2'33	85'45	12'50	H. Tate and Sons	18
1'065	13'40	2'50	84'27	12'80	S. Stein	19
1'061	12'60	2'30	84'56	12'00	Do.	
1'094	18'70	3'70	83'48	18'10	Do.	20
1'077	16'30	2'30	87'63	15'40	Do.	
1'091	18'30	2'70	87'14	17'40	Do.	
1'081	16'70	2'70	86'08	16'00	Do.	
1'086	18'30	2'40	88'40	17'20	Do.	
1'090	18'80	2'60	87'85	18'00	Do.	
1'069	14'20	2'60	84'52	13'70	Do.	21
1'076	15'40	2'90	84'15	14'60	Do.	
1'071	14'70	2'60	84'97	14'00	Do.	22
1'078	15'50	3'30	82'44	14'07	A. Lyle and Sons	23
1'084	17'10	3'00	85'14	16'40	S. Stein	24
1'081	16'80	2'60	86'54	16'20	Do.	
1'078	16'30	2'60	86'24	15'60	Do.	
1'082	16'80	2'90	85'27	16'00	Do.	
1'068	12'30	4'25	74'32	12'10	A. Lyle and Sons	25
1'065	12'60	3'20	79'75	11'46	Do.	26
1'066	12'60	3'40	78'75	10'68	Do.	

TABLE II.—RESULTS OF ANALYSES OF SPECIMEN

Reference Number.	County.	Variety of Seed.	Average Weight		Degrees Brix (Dry Matter).
			With leaves.	Without leaves.	
			lbs.	lbs.	
27	Cornwall - - -	Vilmorin - - -	3'80	2'52	20'80
28	Salop - - - -	Wanzleben - - -	4'94	2'61	17'30
	Do. - - - -	Vilmorin - - -	4'04	2'21	19'20
29	Do. - - - -	Wanzleben - - -	4'24	2'44	17'90
	Do. - - - -	Vilmorin - - -	3'86	2'34	15'50
30	Do. - - - -	Wanzleben - - -	2'68	1'82	18'50
	Do. - - - -	Vilmorin - - -	2'47	1'59	18'30
31	Do. - - - -	Mette Wanzleben -	6'13	3'62	16'40
32	Do. - - - -	Wanzleben - - -	3'49	2'42	19'20
	Do. - - - -	Vilmorin - - -	2'72	1'83	19'00
33	Salop - - - -	Wanzleben - - -	3'64	1'71	18'30
	Do. - - - -	Vilmorin - - -	3'82	2'18	16'70
34	Do. - - - -	Wanzleben - - -	3'97	2'19	17'40
	Do. - - - -	Vilmorin - - -	2'85	1'69	17'10
35	Do. - - - -	French Improved White - - -	1'54	0'95	20'90
36	Do. - - - -	French and German Mixed - - -	5'78	3'34	16'20
37	Somerset - - -	Wanzleben - - -	5'53	3'22	16'27
	Do. - - - -	Vilmorin - - -	4'85	2'39	17'62
38	Wilts - - - -	Do. - - - -	2'40	1'86	18'07
39	Do. - - - -	Wanzleben - - -	1'77	1'14	20'18
	Do. - - - -	Vilmorin - - -	1'40	0'86	18'83
40	Do. - - - -	Schreiber - - -	2'94	1'54	18'90
	Do. - - - -	Wanzleben - - -	2'74	1'57	20'10
	Do. - - - -	Vilmorin - - -	3'23	1'79	19'70
41	Worcester - - -	Schreiber - - -	2'93	1'34	19'70
	Do. - - - -	Simon Le Grand -	3'13	1'93	18'40
42	Cheshire - - -	Schreiber - - -	4'06	1'92	18'70
	Do. - - - -	Vilmorin - - -	3'51	1'73	19'40
43	Cumberland - -	Schreiber - - -	2'35	1'50	15'90
	Do. - - - -	Klein Wanzleben -	3'44	2'13	15'30
	Do. - - - -	Vilmorin - - -	3'71	2'08	16'80
	Do. - - - -	Mette Vilmorin -	3'14	1'92	17'60
	Do. - - - -	Do. - - - -	3'60	1'64	16'80
	WALSLEY :—				
44	Flint - - - -	Schlieckmann - -	1'95	1'21	16'90
	SCOTLAND :—				
45	Aberdeen - - -	Vilmorin - - -	3'84	2'01	21'60
46	Do. - - - -	Janasz - - - -	5'01	3'60	18'50
47	Ayr - - - -	Schreiber - - -	1'86	1'08	17'50
	Do. - - - -	Mette Wanzleben -	3'59	2'08	18'20
	Do. - - - -	Vilmorin - - -	2'17	1'35	16'20

ROOTS GROWN BY EXPERIMENTERS.—*continued.*

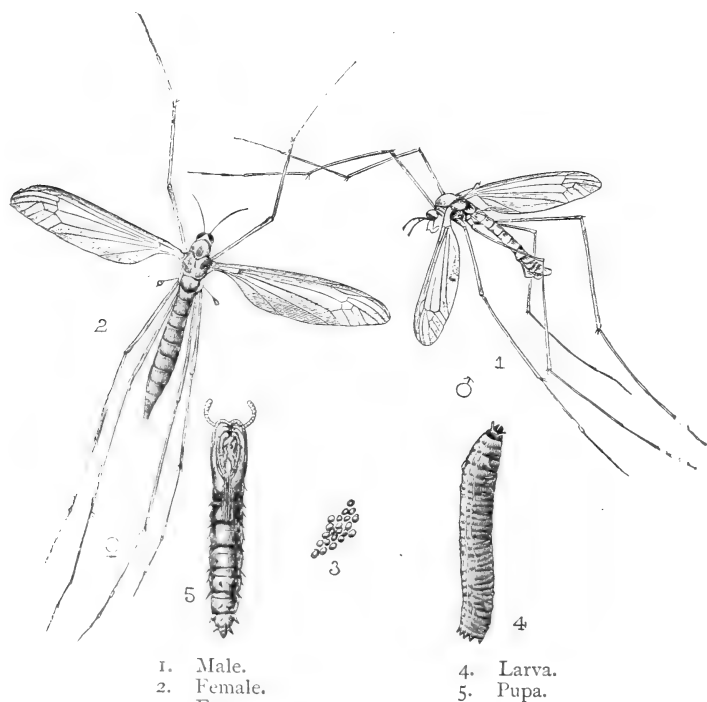
Specific Gravity.	Quantity of Sugar in 100 parts of the juice.	Quantity of Non-Sugar in 100 parts of the juice.	Quotient of Purity.	Quantity of Sugar in 100 parts of the Roots.	Analysed by	Reference Number.
1'087	18'10	2'70	87'02	17'30	S. Stein	27
1'071	14'29	3'01	82'90	12'00	Macfie and Sons	28
1'079	16'01	3'19	83'50	13'30	Do.	
1'073	14'91	2'99	83'30	13'00	Do.	29
1'063	12'91	2'59	83'30	11'50	Do.	
1'076	16'48	2'02	89'40	13'50	Do.	30
1'075	15'11	3'19	82'60	12'20	Do.	
1'067	14'00	2'40	85'36	13'30	S. Stein	31
1'079	15'90	3'30	82'80	12'30	Macfie and Sons	32
1'078	15'81	3'19	83'20	12'40	Do.	
1'075	16'24	2'06	88'80	13'40	Do.	33
1'068	14'19	2'51	85'00	11'80	Do.	
1'071	14'97	2'43	86'00	13'50	Do.	34
1'070	14'20	2'90	83'00	12'80	Do.	
1'087	18'42	2'48	88'15	14'00	Do.	35
1'066	13'17	3'03	81'20	11'40	Do.	36
1'066	13'15	3'12	80'82	12'40	H. Tate and Sons	37
1'072	14'65	2'97	83'14	13'30	Do.	
1'074	15'85	2'22	87'71	14'30	Do.	38
1'084	17'18	3'00	85'13	15'20	Do.	39
1'078	16'18	2'65	85'93	14'50	Do.	
1'073	16'70	2'20	83'06	16'00	S. Stein.	40
1'089	17'50	2'60	87'06	17'00	Do.	
1'082	17'30	2'40	87'87	16'70	Do.	
1'082	17'40	2'30	88'33	16'70	Do.	41
1'076	15'70	2'70	85'32	15'00	Do.	
1'078	16'50	2'20	88'23	15'90	Do.	42
1'087	17'10	2'30	88'14	16'00	Do.	
1'065	13'80	2'10	86'78	13'20	Do.	43
1'063	12'60	2'70	82'35	12'00	Do.	
1'069	14'20	2'60	84'52	13'70	Do.	
1'073	15'20	2'40	86'36	14'30	Do.	
1'069	14'20	2'60	84'52	13'70	Do.	
1'070	14'80	2'10	87'57	14'30	Do.	44
1'090	18'40	3'20	85'19	17'10	S. Stein	45
1'077	16'20	2'30	87'56	15'00	Do.	46
1'072	15'30	2'20	87'43	14'70	Do.	47
1'075	15'80	2'40	86'81	15'30	Do.	
1'067	13'60	2'60	83'95	13'10	Do.	

INJURIOUS INSECTS AND FUNGI.

DADDY LONGLEGS AND SURFACE CATERPILLARS.

Much harm has been caused this season by the large grubs or larvæ of the Daddy Longlegs or Crane Fly. Many complaints were made that "large brown caterpillars" were injuring wheat, seeds, winter oats, winter barley, and strawberry plants. Some correspondents considered them to be "surface caterpillars," others thought that they might be the caterpillars of the "Swift Moth" (*Hepialus lupulinus*). When specimens were sent it was seen that they were larvæ of the familiar Daddy Longlegs Fly (*Tipula oleracea*), and not the caterpillar of *Agrotis* or of the "Swift Moth." It has been therefore thought desirable to reproduce figures of the Daddy Longlegs and of the Surface Caterpillar, in order to show the difference between them.

THE DADDY LONGLEGS.



1. Male.
2. Female.
3. Eggs.

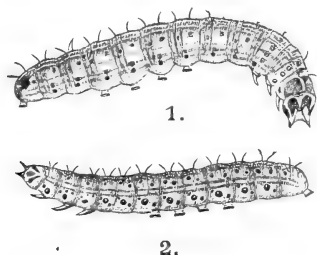
4. Larva.
5. Pupa.

(All natural size except the eggs, which are slightly magnified.)

The Daddy Longlegs grub is about an inch long, of a brownish colour with two light coloured lines down its back. It puts out at pleasure its black head, furnished with strong jaws. The tail end is cut square and has several tubercles. It has no legs, but moves about easily and quickly.

Eggs are laid in the autumn, conical in shape, shining black in colour, and very numerous. One female will lay 300 eggs. They are hatched in fifteen days, and the grubs remain in the earth during the winter, feeding on corn and grass roots while the weather is open, and going down deeper during hard frost. They continue to feed from October until the end of August, when pupation takes place, after which the huge unwieldy flies soon come forth.

SURFACE CATERPILLARS.



1. Caterpillar of the Turnip Moth (*Agrotis segetum*.)
2. Caterpillar of the Heart and Dart Moth (*Agrotis exclamatoris*.)

The Surface Caterpillars are $1\frac{1}{2}$ inch long, greyish or greyish-brown in colour, with sixteen feet. They are hatched out in the beginning of the summer and feed until the spring unless stopped by hard frosts, when they retreat to cells formed in the ground. The caterpillars feed mainly on mangels, turnips, and other cruciferous plants, and are very troublesome to lettuces, carrots, and other garden and market garden crops. They also eat grain, corn, and grasses.

Suitable methods for preventing and remedying the attacks of the grubs of the Daddy Longlegs are given in Leaflet No 11, and of the Surface Caterpillar in Leaflet No. 33, both of which may be obtained, free of charge, upon application to the Secretary of the Board of Agriculture, 4, Whitehall Place, S.W.

INSECTS ON SCOTCH FIRS.

A report was received in February last of an attack upon Scotch fir trees (*Pinus silvestris*) in Somersetshire, the leading shoots of the branches being seriously injured, and the growth in the case of young trees being materially checked, while some trees looked as if they would not recover. Upon examination it was seen that the larvæ of an insect had bored into the stem of the leading shoots, and were feeding upon their sap. The irritation of the larvæ had caused a flow of turpentine, which had dried and caked over the larvæ. In most cases the shoot was dead or dying. Pupæ were also present in some of the holes made by the larvæ, ensconced in slightly woolly cocoons. It was at first considered that the insect was *Cecidomyia* (*Diplosis*) *pini*, as the larvæ and pupæ were somewhat similar, and the position and appearance of the cocoons were similar to those of this *Cecidomyia*. The pupæ were, however, preserved, and on the 20th of March flies came from them which Dr. Meade, the well-known dipterist, pronounced to be *Oscinis maura*. This fly differs in shape and colour from *Cecidomyia pini*, which causes somewhat similar injury to fir trees. It is very dark with a decided green shade, has brown wings, reddish legs, and black femora and tibiæ; it is about the eighth of an inch long. The larva is less than the eighth of an inch long, of yellowish colour and cylindrical shape, without legs, and has a strong pair of hooked jaws well adapted for biting. The pupa is not so long, and rather darker in colour. It is said to be a fairly common insect. Meigen, who calls it *Chlorops maura*, though he assumes it to be the same insect as *Oscinis maura* (Fallern), says it is very common, and that the fly appears in May, and may be seen in meadows. Macquart also states that it is found in meadows. Nothing can be ascertained as to the state in which this insect passes the winter. As larvæ were found active and feeding in February, it might be concluded that it remains in the larval condition during the winter; but it should be noted that there was no cold weather in the last winter, so that this state of the insect may have been abnormal, and, like other species of the *Oscinides*, it may, perhaps, usually pass the

winter in the pupal stage. The appearance of the flies, too, was equally abnormal, as all authorities agree that the fly does not come until May.

But little can be done by way of prevention. The only remedy would be spraying with solutions of soft soap and quassia, in which might be incorporated Paris green at the rate of $\frac{3}{4}$ lb. to 100 gallons of the mixture, or with paraffin emulsion. The spraying must be done well and more than once, in order that the liquid may be distributed between the needles, and run down to their bases and into the holes made by the larvæ.

It is desirable to clip off the infested shoots, but this can obviously only be done on young trees.

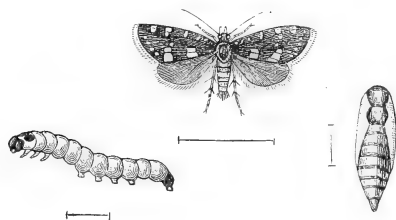
Since the above was written further shoots of Scotch firs have been received from the same locality in Somersetshire, injured apparently in exactly the same manner. Some of the tips were brown and dead, others were dying; and it was reported that about 10 per cent. of the trees were in a bad state, while all were more or less affected.

These injured shoots were received on the 19th of May, and it was seen on examining them that there was no trace of the fly *Oscinis maura* found before, except the holes at the base of the needles; but many eggs and larvæ of an aphid or *Chermes* (*Chermes corticalis*) were discovered enveloped in coverings of white silky threads. The eggs were in groups of ten to twenty, of a light chestnut or yellowish colour, barrel shaped, and very large in proportion to the larvæ. The larvæ were light chestnut in colour, and their antennæ were terminated by bristles, a feature which is peculiar to *Chermes corticalis*, as Mr. Buckton remarks, adding further that "the minute terminal bristles show an approximation to *Coccus*."

This *Chermes* was without doubt doing great harm to the fir shoots, which swarmed with eggs and larvæ; but in the shoots sent in February, all of which were infested with *Oscinis maura*, and which came from the same plantation, there was no trace of the *Chermes*, neither eggs nor any hibernating apterous female. Particular search was made for these, as the attack resembled that of a *Chermes*, but not a sign of

such infestation was noticed at that time. It is apparently a far more serious infestation than that of the *Oscinis maura*, as it continues through the summer, and the *Chermes* increase in the same extraordinary manner as most of the aphides. This attack is known in the forests of Norway and Sweden, in Scotch firs and in other firs, and often causes much harm. Spraying with paraffin emulsion has been tried there, but without any beneficial results, and it has been suggested that the turpentine which exudes from the shoots neutralises the paraffin. But spraying with the soft soap and quassia solution, with Paris green added, as recommended for the *Oscinis maura*, was tried with great advantage. It must, however, be thoroughly done and repeated.

THE RASPBERRY MOTH (*Lampronia rubicella*).



Moth, caterpillar and pupa, all magnified ; the lines show the natural size.

This moth is sometimes most troublesome, destroying whole crops of raspberries, and several complaints have been made this year of injuries caused by it in England and Scotland. When the buds begin to expand, instead of growing out into leaves and blossoms, they become withered and die, so that the canes look as if frost had killed every particle of their foliage. If they are examined it will be seen that there is a cavity at the base of each bud, often extending some way into the pith of the cane, in which a little scarlet cater-

pillar is ensconced ; or there are evident signs that a caterpillar has been there, feeding upon the heart of the bud, and destroying its vitality ; or a chrysalis may be found at the base of the cavity in the pith of the stem. Westwood described this infestation in 1853, and said :—"The attack of the insect involves the destruction of those numerous berries which would have been formed from the buds, and thus, where the insects are numerous, not only is the crop destroyed, but the growth of the shoots for the following year's crop must also be affected." In some cases not only has this effect on the next year's crop been noticed, but some of the worst infested canes have been killed outright. In large plantations of raspberry canes it often happens that this infestation has acquired serious proportions before it is understood. The decay of the canes is attributed to weather or unkind soil, and it spreads rapidly unchecked.

The moth is a very pretty insect, of a light brown colour, having a series of yellow spots as of burnished gold upon its forewings, which are of shining brown.* The under wings are rather lighter coloured, having pale fringes. It is not quite half an inch across the wings, and it is about the fourth of an inch long. Towards the end of May, or in the beginning of June, the moth may be seen flying round the raspberry canes and laying eggs, which are white and round, in the flowers. The caterpillar comes from the egg in about five days, and works its way into the white cone-shaped receptacle on which the fruit is formed. It does not feed upon the fruit, nor at all at this stage, as has been ascertained by Dr. Chapman, but leaves the receptacle of the fruit and goes down to the earth. Mr. Stainton says that it hibernates without feeding, and no traces of feeding could be found, either in the receptacle or in the fruit in which it was ensconced. It remains in a small white, flat cocoon of silk during the winter. When spring comes, it crawls up the canes and gets into a bud and feeds upon it. Sometimes it moves on to another bud if it has exhausted the food supply of the first. After feeding for about fifteen days, it scoops out a hole in the pith at the base of the bud, and turns into

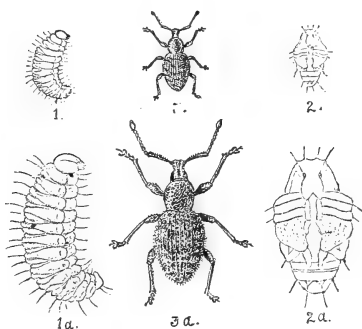
* Stainton's "Manual of Butterflies and Moths." Volume II., page 296.

a chrysalis, from which the moth appears in about twenty-one days. The caterpillar is three sixteenths of an inch long, of a red colour, varying in shade from pinky red to scarlet, and becoming darker as it gets older. It has a black head, with a pale central longitudinal line traversing it, two distinct black spots on either side of the segment next the head, three pairs of black legs, on the thoracic segments, four pairs of forelegs, and a pair of anal feet. The chrysalis is a quarter of an inch in length, of a light brown colour, and has two hooks or recurved spines on the back of the last segment but one. These hooks are described by Westwood, and may be easily seen by the help of a magnifying glass.

As the caterpillars of this moth pass the winter in the earth and rubbish around the stocks of the raspberry canes, remaining there from midsummer until March, it would be well to dig or prong-hoe deeply the earth all round them, so as to destroy or bury the caterpillars deeply. Soot and lime, in the proportion of two bushels of lime to one of soot, might be useful if dug or hoed in close round the canes and scattered over the stocks. Kainit is also a most useful application in the case of these and other larvæ in the earth. In field-culture raspberry stocks are pruned closely, and there are but few stems or canes from each stock. After a bad attack it would be desirable, and not very difficult, to put a little thick soft soap mixed with paraffin oil or carbolic acid, or some other offensive, sticky substance, such as cart grease with a little tar or carbolic acid added to it, upon the lower part of the stem of each cane with a large paint brush, so as to prevent the caterpillars from crawling up. Where infestation is very bad, the canes should be cut off and carried away and burned. In gardens and allotments buds seen to be withering may be pulled off or pinched, so as to kill the caterpillars within them.

It has been noticed that tom-tits are useful in clearing off these caterpillars. They cling to the canes, and with their sharp beaks pull them out of their holes in the buds.

THE CLAY COLOURED, OR RASPBERRY, WEEVIL

(Otiorrhynchus picipes, Fab.).

Larva, 1, 1a; pupa, 2, 2a; weevil, 3, 3a; natural size and magnified.

This beetle was most destructive in hop grounds and fruit plantations in the last spring. The hop shoots were punctured both before and after the bine was tied. In many places it was thought that wireworms were the cause of this mischief, as the beetle is most difficult to detect on account of its earthy colour, and because it only works at night, remaining among the clods near to the hop stocks by day. Wireworms, however, bite only the roots and the shoots of hop plants close to the bases of the roots, whereas the injured hop shoots were found to be bitten all over. Some hop plants were, therefore, kept under observation and the beetles were seen crawling up the shoots just after sun-down. On closely examining the earth round the stocks the next day several beetles were found, though it was most difficult to discover them, as they are so like the soil in colour, and upon being alarmed they remain perfectly motionless, feigning to be dead.

A figure is given above which shows the insect in all its stages. It remains in the ground, in larval or maggot form, until the early spring, when it changes to a pupa, and very soon the beetle emerges and attacks hop plants, fruit trees, and other plants near it. The beetle is clay-coloured, wingless, and the third of an inch long. Eggs are laid in the ground towards the end of the summer. The larvæ, or maggots, cause much injury to the hop stocks or "hills" in which

they live and feed during the winter. They also attack the roots of other plants, as vines, strawberries, and gooseberries.

The beetle is often very injurious to bush apple, pear, and plum trees, by gnawing the bark or skin off the shoots, and in the case of grafted fruit trees it occasions serious damage by biting the young shoots of the grafts. Several instances have been recently reported in which the grafts died, and it was supposed the grafting had been either badly performed or that the grafts had not taken properly, but after careful examination it was discovered that the bark or skin had been gnawed all round the shoots. The trees were watched and beetles were seen ascending them in the twilight. An attack of this kind caused serious losses in fruit plantations where many trees had been grafted. It was a difficult and expensive process to eradicate the beetles in these circumstances, as it was necessary to constantly examine the earth close round the trees and to move it frequently for some distance round them.

In trees worked high the beetles may be checked by placing unpleasant compositions between the ground and the grafts, or they may be caught by holding tarred boards in such a way that on tapping the trees smartly the beetles fall into the tar, but for trees worked near the ground on Paradise and Quince stocks these measures are not so easily applied.

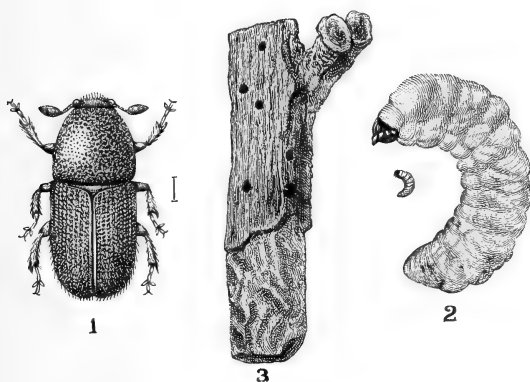
Wall fruit trees, especially apricots, are often much damaged by *Otiorrhynchus picipes*, and peaches, nectarines, and plum trees upon walls also sometimes suffer from their attacks. In all cases of injury of this nature the old nail holes, cracks, and crevices in walls should be examined and the holes should be filled up with mortar or cement, as they afford shelter not only for these beetles, but also for other injurious insects.

This beetle is often called the raspberry weevil, as it is most mischievous in plantations of this fruit, and when once established there it is difficult to get rid of it. The soil round the canes should be hoed frequently, and tarred boards held beneath the canes at night so that on shaking the latter the beetles fall into the tar. Strawberry plants are also often

attacked by this insect, which causes great havoc before it is discovered. Little can be done in this case, and it is better not to plant the infested land or land near it with strawberries again for some time.

It may be observed that the *Otiorrhynchus picipes*, with its allies *Otiorrhynchus sulcatus* and *Otiorrhynchus tenebricosus*, is one of the troublesome insects of which the numbers and ravages have materially increased in late years, probably owing to the extended cultivation of fruit trees.

THE FRUIT TREE BEETLE (*Scolytus rugulosus*).*



1. Beetle magnified; line showing natural length. 2. Larva, natural size, and much magnified. 3. Piece of apple branch, showing holes in bark made by the beetle, and channels made in the wood.

This little beetle has been somewhat troublesome lately, and shows a disposition to increase. It may be that on account of its small size it has escaped observation, and its mischief may have been attributed to other causes, but it certainly is much more in evidence than formerly. Not only has it attacked apple, pear, and plum trees, but peach and nectarine trees have also been injured by it, as well as flowering shrubs, in gardens, of the *Malus* and *Prunus* tribes.

* A leaflet (No. 49) relating to this insect may be obtained, post free and free of charge, on application to the Secretary, Board of Agriculture, 4, Whitehall Place, S.W.

It has been considered that only trees that are weakly and unhealthy are liable to the attack of the *Scolytus rugulosus*; but this is by no means the case, as trees, apparently quite healthy and vigorous, have been found to be infested by this beetle, which seemed to be the sole cause of the mischief occasioned in these cases. Similar observations have been made in the United States of America, where perfectly vigorous trees have been attacked by the beetle. It would seem, therefore, that healthy and unhealthy trees are alike liable to this infestation.

The first indication of the attack is the shrivelling of the tips of the smaller branches, in which small holes and tunnels will be found, and, on inspection, it will be seen that the tunnels and borings extend throughout them to the larger branches, and even to the trunk. A badly infested tree should be cut down and burned during the winter, in order to prevent the beetles from flying to other trees in the spring. In cases of recent infestation it is of great benefit to work paraffin oil into the infested parts with a brush, so that it may enter the holes made by the beetles.

CANKER ON APPLE AND PEAR TREES.

There is more than one disorder of apple trees wrongfully designated as "canker," and injuries from hail, frost, and other climatic causes are often generalised under this term. But what experts mean by canker is the disease occasioned by the fungus *Nectria ditissima*. It is known in France as *Chancre*, and in Germany as *Krebs*, and it is unmistakable, as in one of the stages of the affection little coral-red dots, which are the *perithecia* or spore cases of the parasite, are found in the folds of the infected bark.

The action of true canker is, as common observation indicates, comparatively slow. Hartig states, in his *Baumkrankheiten*, that it does not usually extend more than half an inch in a year; while in other attacks attributed to "canker"

the disorder usually spreads with far greater rapidity, and trees are quickly destroyed. One form of affection of this nature is undoubtedly due to bacterial agency, and to the bacillus defined by Professor Burrill in the *American Naturalist* as *Micrococcus (Bacillus) amylovorus*. This microbe is most disastrous in its effects upon apple and pear trees in the United States, and spreads with great rapidity. Pear trees, perhaps, are more liable to this infection than apple trees in the United States, but the liability of the two kinds of trees varies in different States. It attacks chiefly the inner bark and cambium of the body of the tree, as well as its most important branches. Unlike the fungus *Nectria ditissima*, producing the ordinary canker, which establishes itself only in already existing wounds, scars, and cracks upon the bark of trees made by pruning, hail, insects or other fungi, the *Bacillus amylovorus* descends with the sap in the living bark, through the twigs and branches, to the body of the tree. Trees infected by this microbe are found to be perfectly healthy at their roots and up to the part where the blight has reached, showing that infection comes from the upper part of the tree. It sometimes commences its attack in the blossom, or on the tips of the shoots at the ends of the branches. In the spring it is said to be always first noticed on the blossoms, which turn black as if injured by frost. The microbes stand cold well, and it has been found that the bark of infected trees contains living colonies for a longer period in the winter than in the summer. In spring-time, when the trees are full of sap, the microbes invade new bark and spread rapidly. At this period of the year, too, a viscous, sweetish, brownish yellow substance exuded from parts of the stem and branches attracts bees and other insects, which convey the microbes to the blossoms, and thus disseminate the infection extensively.

In this country apple and pear trees are often seen with the blossom blackened as if by frost, with withered or dying tips of branches, with deep wounds in the bark, and with their skin peeling and cracking in all directions. Frequently no trace of *Nectria ditissima* can be found in these cases, and the appearances correspond generally with those occasioned

by the *Bacillus amylovorus* in America. The treatment which has been found successful in arresting this disease in transatlantic orchards may prove equally successful in this country. It is simple, consisting merely in cutting out and burning every particle of infected wood before the sap begins to rise. The infected centres may, however, be cut away at all times of the year. American experts advise that a careful inspection should be made of all apple and pear trees two or three times during the summer. It takes two or three years for the disease to become a serious epidemic; but the early removal of the first cases will prevent this development, and will, at the same time, save much labour later, as well as many valuable trees.*

Specimens of diseased apple branches were sent to the Board of Agriculture from Victoria, British Columbia, in February last, by Mr. Palmer, Inspector of Fruit Pests, who found that while the disease affecting them was much the same as that described as canker, or *Nectria ditissima*, in this Journal for December, 1895, it differed in certain respects, although its effects on the trees were similar. The branches sent were from a Rhode Island Greening apple tree, the whole of which is affected more or less, and will, it is thought, succumb during the present year. Mr. Palmer writes: "It seems to me that you may have in England other forms of canker besides *Nectria ditissima*, one of which may be identical with the specimens now sent." An examination of these indicated that the cause of the disorder was not *Nectria ditissima*, though, as Mr. Palmer said, there was considerable resemblance in certain points of the affection. There were scars or wounds, and decay of the tips of the branches; but there was, in addition, a peculiar shrinking and cracking of the skin generally, close above or below or all round the bases of the twigs. In cutting deeply into the branch the green layer under the epidermis and the cambium layer were seen to be discoloured. There was no flow of viscous liquid traceable, as the branches had been cut off in winter and before the flow began. There was dried

* Yearbook of the U.S.A. Department of Agriculture, 1895.

matter round the edges of the scars which may have been congealed exudation. Upon a careful consideration of all the conditions of the infected apple branches, in connection with the reports and notes on the attacks of the *Bacillus amylovorus*, it was concluded that there were many features of resemblance, and some of the branches were submitted to bacteriological examination ; but they were so much dried up that it was hardly possible to detect the presence of bacilli.

AGRICULTURAL AND MISCELLANEOUS NOTES.

AGRICULTURE IN MEXICO.

The Board have received through the Foreign Office a summary, prepared by Sir Henry Dering, Her Majesty's Envoy at Mexico, of a volume of statistics concerning the value of the yearly agricultural productions of Mexico, as well as the value of urban and rural property throughout the country, in 1897. Much of the information contained in this publication is novel, and while it is admitted that the usual difficulties have been encountered in obtaining, from proprietors and cultivators of the soil, an exact estimate of the value of their land or of the crops raised on it, it is thought that an addition of something like 20 per cent. to the figures referring to the crops raised, and to the actual value of rural property, will probably represent their value with tolerable accuracy.

An official investigation has for the first time been published of the number of estates ("haciendas") in the Republic, with an indication of the branch of agriculture to which the land is chiefly devoted. From one State (Chihuahua) the returns have not been received in time for inclusion with the total; but apart from this the number of principal haciendas numbered 8,100. Of these, 3,400 were chiefly under cereals; 1,560 were mainly devoted to cattle raising, 1,385 to sugar-cane, 395 to henequen hemp, 373 to coffee, 239 to cacao, 135 to cotton, 413 to agaves, 92 to tobacco, and 5 to the vine. With regard to cereals, the first place is taken by the State of Guanajuato, with 364 haciendas principally under grain; Puebla having 328, and Jalisco 275; while at the other end of the scale the small States of Morelos and Colima, and the Federal District, have four, five, and six properties, respectively, claiming cereals as their chief crop.

The production and value* of the principal cereals in 1897 was as follows:—

		Quantities.	Value.
		Bushels.	£.
Wheat	- - - -	9,680,000	1,868,000
Maize	- - - -	118,126,000	8,723,000
Barley	- - - -	8,569,000	550,000
		Cwts.	
Rice	- - - -	415,000	226,000
			<u>£11,367,000</u>

The production in 1897 accordingly represented a value of about eighteen shillings per head of the population. As wheat and maize are not exported, these two grains may be reckoned as being wholly consumed within the country. The amount produced per head thus appears to have been about nine bushels of maize, and a little over two-thirds of a bushel of wheat, in the course of the year. The annual production of maize was approximately valued at seven dollars per head (about fourteen shillings), these figures revealing the economical scale of living of the majority of the population, and their limited expenditure on food supplies.

There were, according to the Customs returns, nearly three million bushels of maize imported into Mexico during 1897, forming an addition to the total available for consumption.

The production of alcohols and fermented drinks, excluding grape products, was given as 138 million gallons, valued at £1,607,000, of which 58,000,000 gallons were "pulque," 54,000,000 gallons "sweet pulque" (unfermented), and 18,000,000 gallons spirit from sugar-cane. According to these figures the annual production of alcohol and fermented liquors was about 11 gallons per head, worth about 2s. 8d.

The production of fibres is very important in Mexico, the yield of "henequen" hemp in 1897 being 110,000,000 lbs, of "ixtle" 28,000,000 lbs, and of cotton 72,600,000 lbs. The production of cotton, which prospered greatly before the conquest, and which had been reduced to nothing—a condition which continued until a few years ago—has now revived in Mexico. The production of sugar is given as 1,293,000 cwts., of "panocha" 1,215,000 cwts., and of molasses 881,000 cwts.

* The Mexican dollar has been taken as equal to 2s.

The yield of cacao, coffee, tobacco, and vanilla is given as follows :—

	bs.	£
Cacao - - - - -	1,298,000	57,000
Coffee - - - - -	48,054,000	828,000
Tobacco - - - - -	19,659,000	299,000
Vanilla - - - - -	518,000	19,000

From the preceding figures, and others of less importance furnished, the following table can be formed of the value of the vegetable productions of the country in the year 1897 :—

	Value.
Cereals - - - - -	£11,367,000
Vegetables - - - - -	1,892,000
Cacao, coffee, tobacco, vanilla - - - - -	1,203,000
Sugar-cane (sugar, molasses, etc.) - - - - -	1,569,000
Roots and tubers - - - - -	556,000
Textile fibres - - - - -	2,317,000
Alcohols and fermented liquors - - - - -	1,607,000
Products of the vine (wine and spirits) - - - - -	38,000
Oleaginous plants - - - - -	86,000
Dye-woods - - - - -	238,000
Tanning plants - - - - -	28,000
Gums and resins - - - - -	69,000
Medicinal plants - - - - -	1,000
	£20,971,000

If to these figures the value of the production of wood and timber, given as £1,786,000, is added, the total is raised to £22,757,000.

The inquiry into urban and rural property gave a sum of £66,032,000 as the value of the territorial property of the Republic, a figure which, it is thought, might safely be raised to £80,000,000 in order to arrive at an estimate of the real value of the properties in question. It is to be remembered that these figures represent only the "fiscal" value of the property, an amount which is always notably below the reality. The total value of the urban property amounts to £29,825,000; that of the rural to £36,207,000. In many of the States the value of the urban and rural property is about equal; the chief exception is the Federal District, where the urban property is estimated at £11,545,000, and the rural at £2,296,000. On the other hand, the rural property in Hidalgo is valued at £1,748,000, and the urban at only £197,000. The State in which the value of the rural property is greatest is Guanajuato (£3,279,000), followed by Jalisco (£3,130,000). From the extent of the Republic, and the fertility of many parts, a greater value of rural property

might have been expected ; but the low apparent value is to be partly accounted for by reason of the large extent of land still uncultivated, and the still greater difficulty of obtaining exact declarations as to the value of rural as compared with urban property.

AGRICULTURAL EDUCATION IN RUSSIA.

The Russian Minister of Agriculture has recently laid before the Agricultural Council a proposal for a general scheme of agricultural education. The introduction to this document states that, notwithstanding the fundamental importance of agriculture to Russia and the great fertility of some of the Russian soils, the crops obtained even in the "black soil" regions are only one-third to one-half as large as those harvested from the inferior soils of Western Europe. Almost everywhere in Russia primitive processes of farming are persistently followed by the farmers, while the number of persons who are fitted by education and training to disseminate information on the rational methods of agriculture is comparatively insignificant. The proposed scheme provides for (1) higher education, furnished by independent agricultural institutes and by chairs of agriculture and allied sciences in the universities ; (2) agricultural high schools ; (3) lower agricultural schools ; and (4) the diffusion of general agricultural information.

The schools for the so-called lower agricultural education include (a) secondary agricultural schools, (b) primary agricultural schools, (c) agricultural classes, and (d) practical agricultural courses. These are to be under the jurisdiction of the Minister of Agriculture and Imperial Domains. They are to be maintained at the expense of municipalities, local communities, associations, etc., but may receive part of their support from the Government. The secondary schools are to be open to young men of all conditions, who have completed the course in the primary public schools. The course of instruction is to extend over four years. The primary agricultural schools are open to all who can read, write, and have a

certain knowledge of arithmetic, and the courses last from one to three years. They include, apart from general studies, instruction in the elements of agriculture, with practical exercises. The classes in agriculture are intended for the instruction of young men of the peasant class. The course does not last longer than two years, and consists in the study of the rudimentary principles of agriculture and their application to local conditions.

The successful completion of the courses in these three grades of the lower agricultural schools carries with it certain reductions in the military requirements, dependent upon the grade. The practical agricultural courses are designed to impart popular information in particular branches of agriculture. The instruction does not continue for more than a year, and consists in demonstrations, lectures, and practical exercises in different branches of agriculture in their application to local conditions and especially to the conditions of the peasants.

The diffusion of general agricultural information is to be provided for by (1) the organisation of public lectures for the benefit of different classes of the population; (2) instruction of teachers in public schools in agriculture, etc.; (3) the teaching of agriculture in the normal schools; and (4) the introduction of supplementary courses in agriculture in the village schools. There are now in Russia three schools for higher agricultural instruction, nine agricultural high schools, 83 lower schools, and 59 special schools. Steps have been taken for the establishment of about 50 additional agricultural schools.

AGRICULTURAL EXPORTS OF THE UNITED STATES.

The following particulars as to the exports of agricultural products from the United States in the year ended June 30, 1898, have been taken from the tables relating to the Foreign Commerce of the United States recently issued by the Bureau of Statistics. The total exports of domestic merchandise were valued at £252,144,000, and of this total 70·5

per cent., or £177,851,000, were agricultural products; these figures are the highest ever recorded, and, compared with the average of the previous five years, show an increase in the total of £69,276,000, and in the agricultural exports of £50,755,000. The three great classes of agricultural production, viz., breadstuffs, provisions, and cotton, account for 92 per cent. of this increase.

The various grains and flours, which are included in the largest of these three divisions under the name of breadstuffs, were exported to the value of £69,562,000, as compared with an average of £34,205,000 for the preceding five years. Wheat, maize, and oats accounted for a large proportion of this increase; the quantity of wheat exported being especially noticeable, the total shipments in the year under review representing no less than 148,231,261 bushels, whereas the average for the previous five years was 84,370,000 bushels. In the year 1892, however, 157,280,000 bushels were shipped, the highest quantity ever recorded. The major portion of the export of this grain was consigned to Europe, chiefly to the United Kingdom, France, and Belgium. The export of maize and maize flour again increased, and was in 1898 the largest hitherto recorded, amounting in the past year to 212,055,000 bushels, against 178,817,000 bushels in 1897, and 101,100,000 bushels in 1896. The United Kingdom, Germany, and France, were the principal customers for this product. Among the other breadstuffs the exports of oats and oatmeal showed the largest increase, amounting together to 72,784,000 bushels in 1898, compared with 37,119,000 bushels in 1897.

The export of provisions, which comprise meat and dairy products, were valued in 1898 at £34,863,000, or £6,282,000 in excess of the average of the five years 1893-97. The quantities of beef products exported were not exceptional, but it may be noted that the consignments of canned beef to Europe, which have been steadily declining for some years, further fell to £535,000, whereas in 1891 this item was worth about £1,775,000. The decline in the canned beef trade has been, however, more than compensated for by the increased exports of fresh beef, which were valued last year at £4,785,000, and consigned, as usual, almost exclusively

to the United Kingdom. The hog products showed a considerable increase, from £17,224,000 in 1897 to £23,084,000 in 1898; 5,804,500 cwts. of bacon were exported, and 1,787,400 cwts. of hams, of which 4,225,000 cwts. and 1,371,000 cwts. respectively came to this country. Among other hog products may be mentioned lard, of which 6,333,400 cwts., of a value of £8,273,000, were exported in 1898, as compared with 5,074,200 cwts., valued at £6,068,000 in 1897. Of dairy products, neither butter nor cheese show any increase over 1897. In the case of the former article, 229,400 cwts. were exported, or about 50,500 cwts. less than in 1897. Of this total 132,200 cwts. went to the United Kingdom. Cheese showed a small increase in quantity compared with 1897, but a fall in value, the figures being 474,700 cwts., valued at £949,900, against 454,900 cwts., of a value of £965,800 in 1897. The average annual export of the preceding five years was 597,000 cwts.

The shipments of raw cotton were valued at £48,009,000 in the past year, compared with an annual average of £42,729,000 in the period 1893-97.

ACCOUNTS OF DANISH DAIRIES.

A review of the progress of the dairy industry in Denmark in 1898, published in the *Tidsskrift for Landokonomi*, furnishes some interesting details from the balance-sheets of a number of Danish dairies. The statements are abstracted from accounts relating to eighteen dairies, which ranged in size from an establishment manipulating the milk of 34 cows to one drawing its supplies from 292 cows. The average yield of milk per cow in the twelve months, as returned by the separate dairies, ranged from 386 gallons to 636 gallons; calculated on the total number of cows included in the eighteen accounts it averaged 516 gallons. The value of the products of the dairies represented an average return per cow of £11 7s. 6d., while the average estimated cost of maintenance for each cow amounted to £5 16s., thus leaving a gross profit,

exclusive of the value of the calves, of £5 11s. 6d., from which wages and other charges had to be paid.

An example of the cost of running a large co-operative dairy is afforded by a statement of the outgoings and receipts of one establishment of this class in Jutland. In the twelve months ending with November 4th, 1898, this dairy manipulated 591,499 gallons of milk, for which the sum of £10,414 12s. 10d. was paid to the members who supplied it. The working expenses amounted to £1,292 17s., or 4s. 4½d. per 100 gallons of milk. They included wages, £222 4s. 5d.; cartage, £316 5s. 9d.; repairs of buildings, machinery and appliances, £344 7s. 5d.; rent and interest on loans, £187 4s. 5d.; coal, £100 12s. 9d.; ice, salt, and sundries, £122 2s. 3d. The total receipts amounted to £14,299 2s. 6d., derived from the sale of the following products:—1,968 cwts. of butter, valued at £9,932 18s. 10d.; 1,090 cwts. of cheese, valued at £1,892 6s. 7d.; 410,570 gallons of separated milk and butter milk, valued at £2,198; milk and cream of the value of £66 os. 6d.; and whey, 1,496,771 lbs., of the value of £188 19s. 9d.; the balance of £20 16s. 10d. being made up of sundry receipts.

The year's accounts show a net profit of £2,591 12s. 8d., or 1'05d. per gallon of milk, so that for every gallon of milk supplied to the dairy the members received altogether 5¼d., this sum including the price originally paid for the milk and the profit on the sales of produce.

GERMAN POULTRY SOCIETIES.

Numerous societies for the promotion of poultry-rearing exist throughout Germany, where it is a common practice for persons interested in the industry to associate for the purchase of pure bred birds to improve the local stock. Many associations of this kind have established stations in order to maintain a supply of thoroughbred breeding fowls, and, in some cases, the smaller societies have federated for the purpose of holding shows and providing organised

instruction by means of lectures for the common benefit of their members. In this connection, mention may be made of the Central Union of Poultry-breeders of Hanover, to which are affiliated 49 local associations with a total membership of 3,954 persons. Through the agency of this union 85 breeding stations have been established in various parts of the province, and over 750 thoroughbred cock birds are annually placed at the disposal of members of the local societies. The funds of the latter are derived from members' subscriptions, which range from 2s. to 6s. per annum, and from the sale of sitting-eggs, while the Central Union is supported by annual contributions from the affiliated associations, at the rate of 6d. for each member enrolled on their books. Poultry shows are frequently held by the separate societies, and on a larger scale by the Union; the Union also publishes a journal.

Little has been done hitherto by any of the German societies in the way of co-operation for the sale of poultry and eggs, but the Hanover central society has made arrangements for the organisation of this branch of the industry on the lines of the Danish association, to which reference is made elsewhere in this journal. The establishment of egg-collecting stations on the Danish model has also been undertaken by the poultry section of the leading agricultural society in East Prussia.

DANISH POULTRY SOCIETIES.

The first important association of poultry keepers in Denmark was formed at Aarhus about twenty years ago. At a later period an offshoot from this body was started in Copenhagen, but it eventually combined with the parent society in the formation of one great association for the whole of the country, with its headquarters at Copenhagen. The principal object of the society is the promotion of poultry rearing for profit by agriculturists. As a first step in this direction an endeavour was made to improve the native race of fowls by the importation of French, Spanish, and

Italian breeds, and at the same time to strengthen the original stock of the country by careful selection. Asiatic breeds were afterwards largely introduced for crossing purposes in order to increase the production of eggs with brown shells, which are much in demand for export. The society holds shows from time to time in different parts of the kingdom, and stations have been established in the different provinces for breeding birds of pure blood, chiefly of Italian and Spanish races, as these have proved to be more suitable than French fowls for the Danish climate. Members of the society can obtain the use of these birds free of charge, and other persons may enjoy the same advantages on payment of a small fee; sitting-eggs are also supplied by the stations on similar terms. Information and instruction is provided by the society's travelling lecturers and by means of a periodical journal.

The members of the society are divided into three classes of honorary, extraordinary, and ordinary members. The first are elected by the council; the extraordinary members are life members who compound for their subscriptions by the payment of 50 kr. (£2 15s. 6d.), while the ordinary members pay, as a rule, a minimum subscription of 2 kr. (2s. 3d.) yearly, but this is reduced in the case of cottagers to 1kr. (1s. 1½d.). The business of the society is managed by a small executive committee, who are responsible to the general council which consists of 38 representatives, 2 for each province, elected at the annual meeting of the members.

An institution of more recent origin, which is exercising considerable influence on the development of the trade in eggs from Denmark, is the co-operative association for the export of eggs, which was founded at Vejle in Jutland in February, 1895. This society has now 345 branches throughout Denmark, and numbers altogether 18,500 members. Export depots have been established at Vejle, Odense, Aalborg, and Copenhagen, to which the branch societies forward the eggs collected from their members. On arrival at the depots the eggs are stamped with the society's mark, sorted into five classes, according to size, and packed in boxes lined with wood-wool for export to the United Kingdom. In

order to keep some control over the quality of the eggs they are marked with the number of the branch which collected them, and also with the register number of the member who supplied them. To secure freshness the branches are required to forward the eggs to the depot within four days of the date of collection. Any branch which infringes the regulations as to delivery is subject to a fine, and if it fails to deliver a supply of eggs for a period of six months it is thereby dissolved.

The work of the association is carried on under the superintendence of a council of five members, whose principal duty is to see that proper arrangements are made for the disposal of the eggs abroad. The members of the association are paid for their eggs on delivery at a price fixed by the committee on the market quotations. These payments are made by the committee through the branches from the funds at the disposal of the association. At the end of the year the accounts are made up and the profits on the year's working, after deducting the expenses of packing, superintendence, freight, etc., are distributed amongst the members of the association in proportion to the number of eggs each has furnished. The branches contribute a yearly subscription to the common fund of the association at the rate of 6d. per member.

EXPORT OF HORSES FROM THE UNITED STATES.

In a "Special Report on the Market for American Horses in Foreign Countries," the United States Secretary for Agriculture states that the export trade in horses has made great strides within the past five years; in fact, its beginnings were laid only during the Chicago International Exhibition of 1893. During the following year there were only five foreign buyers in the Chicago market, and only 2,000 horses exported from that city—twice as many as had been sent in an experimental way in the previous year,—while in 1897 there were seventy foreign buyers, and three-fourths of the horses exported to Europe went directly from that market.

From returns given in this report, it appears that the exports of horses from the United States during the five years 1892-3 to 1896-7 have been successively 2,967; 5,246; 13,984; 25,126; and 39,532; their total value having grown from £150,000 to £994,000. Nearly half of the number—45 per cent. during the period—have been shipped to the United Kingdom, while Canada has taken 21 per cent., and Germany 11·5 per cent. of the whole. The actual numbers received in this country from the United States have grown during the calendar years 1893 to 1897, according to the British Trade Returns, from 1,319 to 26,520. Some few of these were doubtless passing through the United Kingdom in transit, their ultimate destination being Belgium, Germany, or France. Our receipts from Canada during the same period, it may be mentioned in this connection, also exhibit a material increase, although not so great as in the case of the United States.

The principal horse market in the United States is Chicago; and that the larger number offered for sale there are not to be rated as first class appears from a report by a Government inspector at the stock-yards. He states that 86,500 horses were sold from the Chicago market in 1896, and that 80 per cent. of these were common, leaving some 18,000 desirable horses, of which 60 per cent. were purchased by foreign buyers. During the first six months of 1897, there were 52,400 sold, less than 25 per cent. being of a class available for exportation, and practically the whole of these were taken for that purpose.

It is stated that in London the tramway and omnibus companies, jobmasters, and owners of light delivery waggons are large purchasers of American horses.

This report was the outcome of an inquiry made owing to the low prices recently prevailing in America. Horses being then practically a drug in the market, the stock could with advantage be sold cheaply in Europe. As a result, this American trade is considered to have lowered prices, and to have depressed the horse-breeding industry in England; but it is added that the price in the United States is now improving.

CATTLE BREEDING IN SPAIN.

In his annual report on the trade of Corunna during the year 1898, Mr. Consul C. A. P. Talbot states that, although business in general is less than it was formerly, cattle continue to be exported in large numbers from the province of Galicia, principally to the interior of Spain. It is stated, for instance, that an average of fifteen cattle trucks, each containing thirty-two head of cattle, are despatched every day from the town of Lugo alone. A large number are also despatched from Monforte and Cuntis, important stations on the Northern Railway.

The cattle of Galicia are reported to be decreasing in numbers, and to be deteriorating in quality. It is therefore proposed to establish small breeding establishments at different places in the province, and good bulls of good foreign breeds will be kept for the purpose of crossing with the native cow. No financial aid is expected from official sources, and the project will be carried out by private enterprise. The apathy of the peasants in these matters appears, however, to be considerable; and it is stated that at the experimental farm belonging to the Corunna Town Council several bulls of various breeds have been kept for some time, and their services have been offered to the other municipalities in the province, the only expense incurred being that of the animals' maintenance. Not a single town council has, however, applied; and the consequence of this apathy is that the attention of contractors from Zaragoza, Barcelona, and other towns has been diverted from Galicia to the neighbouring provinces of Asturias, Vizcaya, and Santander, where the cattle are superior and more numerous.

[Foreign Office Report, Annual Series, No. 2216. Price 4d.]

THE GRAIN TRADE OF ODESSA.

The annual Foreign Office report on the Odessa consular district for the year 1898 contains some information furnished by Mr. Mackie, H.M. Acting Consul-General, relative

to the trade of the city of Odessa. It appears that there are signs of increased business activity at the port, although the grain export trade is itself decreasing. In this connection it is stated that the grain available for exportation from Russia does not represent an actual surplus above the local requirements, but rather the quantity which the farmers sell in order to meet the many claims of direct and indirect taxation. Indeed, it is held that if the underfed and impoverished peasants were to consume the same amount of food as a Western European labourer there would be little or no grain left for exportation. This artificial state of things is said to be well understood by the Russian Government, which for more than a third of a century has been seeking some solution to the problem by adopting protectionist measures in order to foster home industries and, by making the country self-supporting, to render the poorer classes less dependent upon agriculture for their livelihood. This transition from agriculture to industry has to a certain extent been realised, and its effect is visible in the present condition of Odessa, where, as already stated, the export of grain has decreased; and, agriculture having to some degree given way to industry, there has been a greater internal consumption of grain in consequence.

Several other factors, moreover, prevent the development of agriculture. In the first place, the climate is represented as the most formidable obstacle to an increased production of grain, owing to the many extreme changes of temperature and the insufficiency of rain and snow at critical periods of the year. Even when the crops have escaped destruction by the frosts or droughts and yielded an abundant harvest, the Russian peasant is at the mercy of middlemen who abound in agricultural districts, and by whom the bulk of the profits are greedily swallowed up.

It is therefore feared that for some time to come the Russian peasant will remain a stranger to prosperity, although the Government is endeavouring to provide remedies by the abrogation of customs duty on fertilisers, agricultural machines and implements, and other agricultural requisites; by the establishment of stores for their sale on a system of

easy instalments in the more important rural districts ; by advancing money on grain ; and by the reduction of railway rates on agricultural produce.

[Foreign Office Report, Annual Series, No. 2255. Price 2½d.]

THE USE OF ANTI-FERMENTS IN CIDER MAKING.

Some features of the investigations into the manufacture of cider, which have been conducted for the past few years at Butleigh by Mr. F. J. Lloyd, F.I.C., F.C.S., on behalf of the Bath and West of England Society, have already been noticed in this Journal,* and attention may now be directed to the principal results of the experimental work undertaken in the past year.

The experiments of 1898 were largely concerned with the subject of fermentation, and included a series of trials of various preservatives to determine their effect in checking fermentation. The substances employed were two patent preservatives, mustard, formic aldehyde, boracic acid, and sodium salicylate. In three cases where the preservatives were put into the casks, it was found that neither of the two patented substances had checked the process of fermentation ; mustard, on the other hand, had arrested fermentation, but the cider to which it had been added possessed a strong, unpleasant flavour resembling garlic. Experiments to test the effects of formic aldehyde, boracic acid, borax, and sodium salicylate, and also of pasteurisation, were made with filtered and unfiltered juice in bottles. Formic aldehyde was found to completely check fermentation, but it produced an abundant precipitate and caused both the filtered and unfiltered cider to become cloudy or milky. Boracic acid proved a failure with unfiltered juice ; and borax injured the colour and flavour of the filtered cider. Sodium salicylate checked fermentation to some extent without producing any injurious effects. Pasteurisation of unfiltered juice at a temperature of 140 degs

* Vol. v., No. 2, Sept., 1898.

to 160 degs. F. checked fermentation, but not completely ; but in the case of the filtered cider pasteurised at 120 degs. there was no subsequent fermentation, so that at the end of eleven months the liquid was "as dead as ditch water." In order to ascertain what changes would take place in the bottled cider, without the addition of preservatives or the application of heat, three bottles were filled and immediately fastened up, at the time when the other experiments were started. The cider, of course, fermented, and at the end of eleven months it was found to be "nicely up," with a good sparkle, and of excellent flavour, although it had a little more sediment than was the case with some of the juice to which preservatives had been added.

From the results of the several experiments it would seem, therefore, that none of the ordinary preservatives, with the exception of formalin, had any effect in arresting fermentation when added to cider in cask, or to unfiltered cider in bottle ; and that formic aldehyde or formalin proved useless on account of its peculiar precipitating action, to which reference has been made above. In the case of properly filtered juice the use of preservatives is apparently unnecessary, and detrimental to the cider. The conclusion to which the issue of these investigations is held to point, is that farmers must trust, not to preservatives, but to cleanliness and to care in the manipulation of the juice, if they desire to produce the best cider.

COLD STORAGE OF FRUIT.

The Board of Agriculture have received from the Kent County Council a Report by Mr. W. P. Wright, F.R.H.S., Superintendent of Horticulture under the Technical Education Committee, upon the results of experiments on the Cold Storage of Fruit. Three cold chambers were used, each fitted with two brine walls or flat tanks placed in close proximity to the insulated sides of the chamber ; through

these tanks brine cooled by a carbonic anhydride refrigerating machine was circulated at any desired temperature. Each chamber was fitted with tiers of galvanised wire shelves around the sides, and the fruit was placed on these under three different conditions (1) exposed on the shelves, (2) enveloped in grease-proof paper, (3) surrounded or covered by cotton-wool. It was found that strawberries could be kept for at least three weeks in a temperature of 30 degs., but it was necessary to surround the fruit with cotton-wool, or, in the case of fruit in sieves, to place a pad of that material over the top. When this precaution was not taken, the fruit, though sound, became dull and lost the fresh, inviting appearance which is so important when it is offered for sale. Black currants kept well for 10 days, after which they began to shrivel, but plumped and freshened on exposure to the air so as to be marketable. This was especially the case with black currants that had been stored in market sieves covered with a wad of cotton-wool. After a fortnight's storage, the temperature was raised from 30 degs. to 32 degs. F., and this seemed to give the best results. The experiments with red currants were an unqualified success, the fruit remaining perfectly sound for six weeks, and maintaining its freshness when exposed to a normal temperature for 16 hours. Cherries covered with wool kept for a month at a temperature of 30 degs. and at 36 degs. were not only sound, sweet and juicy, but fresh and clear. After the fourth week the fruit began to wrinkle.

The small fruits above mentioned, and particularly strawberries, must, it appears, be placed in store in advance of dead ripeness; when fully ripe, they will keep for some time, but lose surface freshness; the fruit must be sound, and not pecked or injured in any way.

Greengages were kept in excellent condition for ten weeks and Victoria plums kept for nine weeks, but the cooking varieties of plums, with that exception, did not lend themselves satisfactorily to cold storage.

In the case of apples specimens of most of the leading dessert sorts were stored on September 17th and October 8th, and, with one or two exceptions, they kept till the end of

January; a temperature of 36 degs. being found most suitable. Ripe fruit did not keep quite so well as that which was fully grown and coloured but not quite ripe. A few of the best market sorts of pears were placed in store between August 27th and October 8th, and were found to keep three or four months at a temperature of 36 degs. or a trifle under. The fruit must be stored just before it is fully ripe, care being taken to avoid bruising.

Mr. Wright states that he visited the cold store at the end of March and found sound fruit of the following varieties:— Apples: Cox's Orange Pippin, Colonel Vaughan, Duchess of Gloucester, Worcester Pearmain, Chelmsford Wonder (all early market varieties), Bismarck, Blenheim Orange, and Ecklinville Seedling. Pears: Conference, Doyenné Boussoch, Doyenné du Comice, and Pitmaston Duchess. Most of these are over by Christmas at the latest.

The result of the trials with tomatoes was not a complete success, for, although the tomatoes kept for six weeks, the appearance of the fruit was defective owing to a discoloration at the point of attachment to the foot-stalk.

In concluding his report Mr. Wright observes that, in his opinion, people do not quickly weary of high-class fruit, and a longer season than at present exists could be secured for many kinds if the best quality were ensured; but, apart from this, there are periods within the season of several perishable fruits, black currants for instance, when ability to hold the pickings over, if only for a few days, would mean securing an enhanced price.

INTERNATIONAL CONGRESS OF POULTRY BREEDERS AT ST. PETERSBURG.

An international Congress of poultry breeders was held in St. Petersburg from the 16th to the 20th May last under the honorary presidency of the Grand Duke Nicholas. According to the official programme the work of the Congress consisted in a discussion of the actual condition of the poultry-rearing

industry viewed from a scientific and economic standpoint, and of the measures necessary for its improvement and development. The protection of useful birds was also one of the questions considered. In the course of the proceedings some interesting papers were read by a number of the expert delegates present. Among the subjects dealt with were "Poultry-rearing in Great Britain and Ireland," by Mr. Edward Brown, F.L.S., of Reading College; the "International Traffic in Poultry, Game, and their Products," by M. S. Goulichambarow, delegate of the Russian Ministry of Finance; the "Export of Russian Poultry to France," by M. Ch. Scelle, of Paris; the "Export Trade in Avicultural Products," by M. N. Krioukow, expert attached to the Russian Department of Agriculture; and the "Present Condition of Aviculture in Russia," by M. Abozine, editor of the *Courrier d'Aviculture*.

From a report of the proceedings published in the *Journal de St. Petersburg*, it appears that the conclusions and recommendations of the Congress may be divided into two classes, viz., local and international, the former relating to the measures considered necessary for the improvement and development of the poultry industry in Russia, and the latter comprising such recommendations as were of a general or international character.

With regard to the conditions existing in Russia, the Congress expressed the view that in order to promote the production and exportation of poultry products it was necessary to encourage the establishment of co-operative associations among the peasants, for the collection, classification, and export of eggs, without the intervention of middlemen. Further measures recommended with this object included the institution of travelling poultry shows, at which lectures and demonstrations relating to the industry would be given, the distribution among the peasantry of sitting eggs from fowls of good breed in exchange for eggs produced by the ordinary fowls on their holdings, and the creation of special courses of lectures in aviculture in agricultural and horticultural schools. To facilitate the disposal of Russian poultry and eggs abroad the Congress made two im-

portant suggestions, namely, that commercial agents should be appointed to reside in the principal foreign ports, beginning with London, Hull, and Hamburg, whose duty it would be to watch and report on the condition of the market, and to keep constantly in touch with the societies and producers; and secondly, that measures should be taken to prevent the deterioration and diminution in value, either in transit or in warehouses, of poultry products exported from Russia to England. After hearing a paper on the rearing of pheasants as a Russian industry, by M. D. Naryschkine, the Congress agreed that it was indispensable, in order to create a remunerative trade in this game, to introduce breeding birds from England, which was the only country possessing a pure and healthy race of pheasants. Other suggestions made by the Congress were that laboratories should be created for the study of diseases of poultry, and the methods of treating them; that poultry products should be conveyed by fast trains in waggons specially arranged for the purpose; and that cold stores for these products should be constructed in the large towns and ports.

The principal recommendations of a general or international character included the following, viz.:—That international exhibitions of aviculture should be held triennially in the different European capitals; that the transport of poultry by rail and water should be placed under regulations similar to those imposed on the carriage of animals: and that the Russian Imperial Society of Aviculture should be invited to organize an international competition for incubators, with a view to the invention of cheaper and less complicated machines than those at present available.

VICTORIAN EXPORTED PRODUCTS ACT, 1898.

The Board have received through the Colonial Office a copy of an Act, approved by the Government of Victoria on December 19th, 1898, to provide for the inspection of live-stock, meat, dairy produce, and fruit, intended for export, and to regulate the exportation thereof.

Pine wood constitutes the most important item in the accounts of this trade. In 1897, the latest year for which complete details are available, the value of the imports of hewn and sawn fir was £19,700,000 out of a total of £22,990,000, the remainder being made up of £1,021,000 for hewn oak; £867,000 for hewn teak; £570,000 for staves, and £832,000 for sawn and hewn wood unenumerated.

The countries whence the largest supplies of pine are drawn are Sweden and Norway, Canada, Russia, and the United States. Oak is imported mainly from the United States, Canada, Germany, Austria and Russia; teak comes principally from the British East Indies and Siam; and the trade in staves is for the most part shared by Germany, the United States, Russia, Sweden and Norway.

AGRICULTURAL MACHINERY IN RUSSIA.

With reference to the reduction of the Russian duties on agricultural machinery, which is mentioned in the Journal for September, 1898 (p. 237), Mr. Consul Smith states that the reduction coming into force so late in the season was of little or no benefit to Russian farmers who required to renew their machinery for the harvest. It is, however, expected that the next season will see an increased demand for self-delivery reapers, self-binders, portable engines, and steam threshing-machines.

The alteration practically means a reduction in the price of a reaping machine of about 2*l.*, upon a 10-horse-power threshing set of about 75*l.*, and upon a 60-inch threshing machine when imported alone of about 22*l.* to 25*l.* It must be borne in mind that a portable engine imported alone is still charged the old duty of 1*r.* 40*c.* gold, or 2*r.* 10*c.* in paper currency, per pood (13*s.* 6*d.* per cwt.), and it is only where accompanied by a steam-plough or a steam-thresher with a drum not less than 54 inches wide that the new duty of 50*c.* gold, or 75*c.* in paper currency per pood (4*s.* 11*d.* per cwt.) applies.

In technical language a 54 inch machine designates the

width of clearance in the frame of machine, and consequently the drum is from one-quarter to half an inch less. The Customs authorities maintain that the correct reading of the new tariff is that the drum must not be less than 54 inches wide, and this has been confirmed after an appeal to St. Petersburg. There is now no alternative but for the makers to increase the width of the machine as much as will allow the drum to be 54 inches wide. Mr. Smith thinks that it might be advisable for the interested British makers to collectively approach the Russian Government to obtain the recognition of the present make of thresher as being technically a 54 inch machine.

The practical abolition of the duty upon steam-ploughing tackle ought, in Mr. Smith's opinion, to have an important bearing upon the development of this trade, the more so when the great weight of a complete tackle with, say, two 14-horse-power compound portable engines is considered. It will be interesting to see if such a great reduction in duty will lead to a greater demand among the large proprietors and farmers of Russia, as well as a willingness on the part of the British makers of this class of machinery to take advantage of the opportunity for business now offered them.

[Foreign Office Report, Annual Series, No. 2255, Price 2½.]

RABBIT BREEDING IN BELGIUM.

The breeding of domestic rabbits for the purposes of food and for export is more or less common with the Belgian peasantry, and in the province of West Flanders they are raised in such quantities that thousands of dressed carcasses are shipped weekly to the London markets. The imports of rabbits from Belgium into the United Kingdom during the past five years have averaged 86,000 cwts. yearly, of the estimated value of £234,000, and it is calculated that this weight represents an annual shipment from Belgium of about 2,200,000 dressed rabbits.

Five kinds of domesticated rabbits are bred in Belgium—viz., the ordinary Flemish, the Flemish Giant, the Russian,

the silvered, and the Angora varieties. The native rabbits of Belgium, when wild, are very small, and do not exceed 3 lbs. in weight, and their skins, while of excellent quality, are too small to be profitable for manufacturers of hatters' fur. The ordinary Flemish domesticated variety is the Belgian wild rabbit improved by careful breeding. Its live weight ranges from 6 to 8 lbs. Large numbers are killed for Belgian consumption about Easter time, when they are four or five months of age, and their dressed weight is from 3 to 4 lbs.

The rabbits are bred in cages or boxes. When the cages are placed immediately upon the ground ashes are usually scattered on the spot, then a layer of loose stones is placed on the ashes and finally the stones are covered with straw. This method keeps the cage in a sanitary condition. For fattening purposes a space of at least two feet square is allotted to each rabbit, and the breeding cages are about one yard square. Males and females are separated when three months old, and kept apart until they reach the age of five or six months. The young (eight or ten at one time) are kept with the mother for three weeks and then separated. The ordinary Flemish rabbit breeds four times annually. For breeding the first specimens are selected, but it is not customary to retain any special rabbits for this purpose.

The rabbits are usually fed three times daily. The morning meal is white or black bread, later, toward noon, grass or greens are provided, and in the evening a mixture of boiled potato peelings and bran. Care is taken that the food given to the rabbits is quite dry; no liquid food is provided except in very hot weather. Dry food and dry straw on which to sleep are considered to be the prime requisites for successful breeding.

The season for the export trade is from the beginning of September to the middle of November, when considerable quantities are shipped to England skinned, and packed in wooden crates containing fifty or sixty carcasses. The rabbit is then from five to seven months old, and its dressed weight is between 4lbs. and 5lbs. The skins, after being stretched and dried, are sold to merchants, who collect them at an average

price of 1½d. per skin. These dealers sell them, by weight, to the manufacturers of hatters' furs in packages of 7lbs. to 8lbs. at about double the price at which they themselves have purchased them.

The Flemish Giant variety belongs to the same race as the ordinary Flemish rabbit, and differs from it only in size; as its name implies, it is larger and heavier; it is, in fact, the largest of all rabbits raised in Belgium. Its meat is equally suitable for food, but it is not so generally eaten, owing to its relative scarcity. Not more than one rabbit of this variety exists to 100 of the ordinary kind. Its average live weight is 15lbs. to 18lbs. By reason of its greater size this rabbit is more profitable to farmers than any other variety. It is, however, chiefly raised for exhibition purposes.

The Russian rabbit, which is even more scarce in Belgium than the giant Flemish, is entirely white in colour except the nose and tail, which are black. It is bred mostly for exhibition purposes, but is apparently not worth so much as the Flemish Giant, although the meat is said to be superior. It is small in size, weighing alive, on an average, from 5 to 6 lb., and when dressed about 4 lb.

The silvered variety is in many respects similar to the Russian, and is equally rare. The principal distinction consists in the colour, which is black when the rabbit is very young, but subsequently changes to a silvery greyish hue.

The Angora rabbit, which is kept chiefly for exhibition purposes, is exceedingly small, seldom exceeding 4¼ lb. in weight, although it appears to be much larger by reason of its hair, which measures from 2 to 3 inches in length. The combings from these rabbits sell at 5s. to 8s. per lb., and are used in the manufacture of clerical hats.

EXPORTATION OF PIGS TO THE CAPE OF GOOD HOPE.

The Board of Agriculture have been asked to notify that pigs will not be allowed to be landed from vessels at Cape Town unless the animals are accompanied by a certificate,

obtained by the owner before shipment, from a duly qualified veterinary surgeon, setting forth that at the time of shipment the pigs were apparently free from any contagious or infectious disease; and by a signed declaration of the consignor, made on oath before a competent legal authority, to the effect that the pigs had been on the premises from which they were removed prior to embarkation for at least fourteen days; that during such period no other pigs had been introduced or received on the same premises; that the pigs were not affected with swine fever; that they had not been moved out of any swine fever infected place or area; and further that the movement of the animals was not prohibited by any provision of law then in force in the country, state, or territory from which such movement took place. The certificate and declaration must be delivered to any person authorised in that behalf by the Government of the Colony of the Cape of Good Hope.

AGRICULTURAL EXPORTS FROM CANADA IN 1898.

The export trade of Canada in some of the principal farm products in 1898 showed a considerable increase over previous years. The following comparative statement for the past three years shows the values of the chief agricultural products in 1896, 1897, and 1898:

	1896.	1897.	1898.
	£	£	£
Wheat - - - - -	1,202,400	1,155,000	3,607,100
Flour - - - - -	149,700	321,000	1,130,400
Oats - - - - -	57,100	344,800	633,700
Oatmeal - - - - -	76,000	96,400	115,600
Pease - - - - -	270,700	490,200	377,875
Cattle - - - - -	1,475,500	1,491,500	1,817,400
Cheese - - - - -	2,907,600	3,057,500	3,661,000
Butter - - - - -	219,200	435,200	426,400
Pork, bacon and hams - - -	926,400	1,223,300	1,686,000
Eggs - - - - -	168,100	203,800	261,500

ORDNANCE SURVEY MAPS OF GREAT BRITAIN AND IRELAND.

The Ordnance Survey are issuing a new series of folding pocket maps for England and Wales on the scale of one inch to the mile. The maps are printed in colours on sheets 18 by 12 inches, mounted on canvas, in a cover or flat, price 1s. each. The one inch scale map can also be procured at the same price, in black and white, showing outline and contours; or in outline, with hills printed either in black or brown; the outline map has recently been revised. These maps are not only useful for general topographical purposes, but should also prove serviceable to cyclists and pedestrians, since they show all roads, indicating their character and whether metalled or not, footpaths, hills, rivers, towns, villages, railway stations and local boundaries.

The Ordnance Survey also publish maps on the following scales :—

$\frac{1}{500}$, or about 10 feet to one mile.	} Price per sheet uncoloured 2s. 6d.
$\frac{1}{1056}$, or 5 feet to one mile.	
Both for towns only.	
$\frac{1}{2500}$, or about $25\frac{1}{3}$ inches to a mile. (This is complete for Great Britain, and in progress in Ireland.)	} 3s. od. with areas. 2s. 6d. without areas
$\frac{1}{10560}$, or 6 inches to a mile (Complete for Great Britain and Ireland.)	} 2s. 6d. per full sheet 1s. per quarter sheet

All the above maps are of various dates, and are periodically revised, except the town maps.

There are agents for the sale of Ordnance Survey Maps in most of the chief towns, and maps can be ordered, and indexes, etc., seen at many Head Post Offices, in places where there are no agents. They can also be ordered, through any bookseller or railway bookstall, from the Director-General, Ordnance Survey Office, Southampton; or in the case of Ireland, from the Officer in Charge, Ordnance Survey, Dublin.

AGRICULTURAL LABOUR IN APRIL.

THE Agricultural Correspondent to the Labour Department of the Board of Trade reports, in the *Labour Gazette* for May, that notwithstanding a number of wet and stormy days in April, which interfered with outdoor spring work, agricultural labourers were generally well employed. In the Northern Counties, where outdoor work appears to have been a good deal interrupted, the great majority of the farm servants are hired by the year or half-year, and so wet weather does not affect their employment; but in districts where weekly or daily engagements are the rule it is now frequently said that, owing to the difficulty of getting and retaining men on the farms, employers have to find their men regular work and employ them "wet and dry."

Changes in the wages of ordinary agricultural labourers amounting to a rise of 1s. per week, took place in April in certain districts in the counties of Cambridge, Essex, Herts (in some parishes 2s.), Hants, Leicester, Norfolk, Oxford, Somerset, and Suffolk. In a good many districts in East Yorkshire a rise of 1s. 6d. a week took place. In a few districts there was a rise of 1s., and in some of 2s. or even 3s. Rises of 1s. to 1s. 6d. a week are also reported in districts in Devonshire, Lancashire, and Kent. In one district in the last-named county the rise was from 1s. 6d. to 2s. 6d. A rise of 1s. 6d. a week is reported in a district in Sussex, and of 2s. in a district in Bedfordshire. The changes in wages in most of these districts represent actual increases, as compared with the corresponding period of last year.

ANALYSES OF IMPORTED BUTTER.

In the Journal for December last [p. 370] a statement was given showing the results up to March, 1898, of the examination of samples of imported butter taken at the ports of entry by the Customs authorities, and analysed at the

Government Laboratory on behalf of the Board of Agriculture. A similar statement, with the figures for the year ended March 31, 1899, is given below :—

Country.	1895-96 (May to March).		1896-97 (April to March).		1897-98 (April to March).		1898-99 (April to March).	
	Samples Examined.	Found Adulterated.	Samples Examined.	Found Adulterated.	Samples Examined.	Found Adulterated.	Samples Examined.	Found Adulterated.
Holland - - - -	257	67	349	11	231	1	227	2
Denmark - - - -	202	8	89	—	108	—	97	—
Germany - - - -	171	43	172	32	144	20	111	—
Norway and Sweden -	119	2	113	2	137	—	141	—
France - - - -	65	—	56	—	138	—	145	—
Belgium - - - -	18	—	18	—	5	—	8	—
Russia - - - -	47	5	46	1	57	4	29	—
United States - - -	65	—	54	—	179	—	164	—
Canada - - - -	39	—	33	—	187	—	111	—
Australia - - - -	57	—	16	—	37	—	25	—
New Zealand - - -	21	—	8	—	22	—	14	—
Argentine Republic -	5	—	6	—	26	—	8	—
Italy - - - -	—	—	2	—	—	—	—	—
Spain - - - -	—	—	1	—	—	—	—	—
Uruguay - - - -	—	—	—	—	—	—	1	—
Cape of Good Hope -	—	—	—	—	—	—	2	—
Total -	1,066	125	963	46	1,271	25	1,083	2

(Exclusive of samples broken in transit.)

Mr. Haag, H.M. Acting Consul at Cherbourg, in his report on the trade and agriculture of Cherbourg and district in 1898, states that agricultural syndicates have rendered great services to agriculture in

**Agricultural
Syndicates and
Manures in
Normandy.**

supplying manures and establishing model farms. They have, besides, brought competent men to the fore, who have shown the peasant in a practical way how to increase production and improve the quality of his produce. Mr. Haag believes that there is in his consular district a very large and continually increasing market for artificial manures, and suggests that British firms, if they wish to maintain and improve their position and prices in the market, should send out thoroughly qualified representatives to ascertain the requirements and watch the fluctuations of the market, as a French syndicate is about to be established at Honfleur, which will probably prove a dangerous competitor.

The Board have received information through the Foreign

**Hop Industry
in Bavaria.**

Office that a petition was recently presented to the Bavarian Minister of the Interior by persons engaged in the hop industry, advocating a large increase in the import duty on hops, and also the prohibition of the mixing of Bavarian with other hops. These proposals were referred to the Chamber of Commerce for Middle Franconia, the chief hop district of the country. The latter body opposes both suggestions, on the ground that Germany produced, on the average of the past four years, 500,000 cwts. of hops, and that only some 350,000 cwts. were required to produce the 1,300,000,000 gallons of beer annually made in Germany, so that there was an annual surplus of about 150,000 cwts. Moreover, the addition of fine Bohemian hops is held to be indispensable for the brewing of the mild Munich beers, as well as for the light beers of the Pilsener brand. A strong objection made by the Chamber to the suggested prohibition of the mixing of Bavarian with other hops is that one-third of the Bavarian crop consists of so-called "export hops," which, in order to find a market, have to be mixed with finer sorts from Baden, Wurtemberg, and Alsace. The Bavarian crop averages about 250,000 cwts., or approximately half the total yield of Germany.

In his Report on the Argentine Republic for the year 1898, Mr. Consul Laing, in speaking of

**Breeding Stock
for Argentina.**

the great strides which have been and are being made in the improvement of the stock raised in Argentina, says stock breeders in Great Britain will do well to keep up the quality of the animals they export to that country, as fine animals are being raised on many of the farms, which are in some cases as good as the imported animals. For some time to come Argentina will be a good market for breeders of fine cattle and sheep, especially the latter, and great care should therefore be taken in selecting really fine animals if English breeders wish to maintain their name in the market.

**Our Imports
of Eggs.**

Two years ago attention was directed in this Journal* to the increase in the consumption of foreign eggs in the United Kingdom, and it was shown that our net receipts of these commodities from abroad had increased in fifty years from 72,000,000 to 1,586,000,000 yearly. The more recent trade statistics exhibit no check to the upward progress of these imports, which amounted in 1898 to nearly 1,731,000,000 eggs, of the declared value of £4,456,123.

Russia was the principal contributor to this large supply of the past year, her direct shipments having been in round numbers 438,000,000; Germany is credited with 339,000,000; Belgium with 282,000,000; France with 254,000,000; Denmark with 242,000,000; and Canada with 89,000,000. It should be noted, however, that the German consignments consisted for the most part of the produce of Russia and Austria-Hungary, and that the major portion of the receipts from Belgium are Italian and Austrian eggs, while the latter also form a considerable proportion of the supplies entered from French ports. Among other minor contributors to our imports of eggs in 1898 were the United States, Spain, Portugal, Egypt, and Morocco.

The average declared values per dozen of the consignments received from the chief exporting countries were as follows: France, 9¼d.; Canada, 8d.; Denmark, 8d.; Belgium, 7½d.; Germany, 6¾d.; Russia, 6¼d.

**Cattle in
Paraguay.**

Cattle-breeding and grazing constitute an important branch of business in Paraguay. In former years cattle were imported from the neighbouring Argentine province of Corrientes; but, owing to the rise in prices due to the purchases made by the preserved meat factories, they cannot be bought there now, and cattle of a superior breed are imported from the Brazilian province of Matto Grosso.

* Vol. III., No. 4, March, 1897.

Some cattle breeders in Paraguay have imported half and quarter bred Durham, Hereford, and Holstein cattle with very good results. The stock in the country has steadily increased during the last few years.

(Foreign Office Report, Annual Series, No. 2275. Price 1d.)

A despatch has been received at the Foreign Office from H.M. Consul at Marseilles, reporting that in that city there seems to be a small, but gradually increasing, consumption of Scotch oatmeal. It is retailed there at 10d. the pound, but as it could be delivered at Marseilles by barrel of 220 pounds, all charges paid, duty included, at a rate of less than 2½d. the pound, there would seem to be an opening for business on a small scale.

The Canadian Department of Agriculture has withdrawn from the management of the dairy stations in Prince Edward Island, and the cheese factories and creameries which were formerly under their charge are now conducted by dairy companies. In 1892 there was only one factory in the province, which was placed under the charge of the Department. About the year 1897 the number had increased to thirty-two cheese factories, as well as several creameries; and, in 1898, 46,000 boxes of cheese were exported from the island. The practice of butter-making in winter has also been extended, and nineteen factories continued their operations through the past season.

The Board have received information through the Foreign Office of an outbreak of an epidemic among poultry in the Province of Milan and neighbouring provinces. The disease was at first described as fowl cholera; but recent micro-

**Poultry Disease
in Italy.**

scopic observations made by the sanitary officials of Milan indicate that the lungs are the only organs affected, and it is now pronounced to be pleuro-pneumonia of an infectious type. The malady attacks poultry of all kinds, including pigeons, and in almost all cases death results in a very short time.

The total number of sheep in New Zealand in April, 1898, was returned by the Department of Agriculture at 19,673,725, or about 14,000 less than in 1897. Of these 2,856,699 are of the Merino breed, 56,900 being stud animals and flock rams. Of the remainder, 16,392,711 are crossbred and other long-wool wethers, ewes and lambs, exclusive of stud animals and flock rams. The strains chiefly represented amongst the breeding stock are the Lincoln, which numbers 198,324 stud rams, ewes and lambs, and flock rams; the Romney, numbering 91,559; Border Leicester, 52,592; English Leicester, 41,915; Shropshire, 19,880; Southdown, 3,473; and other breeds, 16,572.

Dairy Machinery Exhibition at St. Petersburg. The Board of Agriculture have received information through the Foreign Office that an exhibition of dairy products, machinery, apparatus and appliances will be held by the Imperial Free Economic Society at St. Petersburg for one month from September 13th, 1899. It will be of an international character so far as concerns dairy apparatus and machinery; apparatus for the practical and scientific analysis of milk, butter, and other products; and vehicles and appliances for the transportation and storage of dairy produce. British exhibits will be admitted into Russia free of duty, so long as they be re-exported after the close of the exhibition; but exhibits sold or otherwise left behind in the country will be subject to duty.

REPORTS ON FOREIGN CROPS.

CROPS IN THE UNITED STATES.

A telegraphic summary in the *Times* states that the statistician of the United States Department of Agriculture, in his report on the condition of the grain crops on 1st June, estimates that there will this year be a reduction of about 470,000 acres, or 2·5 per cent., in the area under spring wheat, as compared with last year. This would indicate an area of about 18,000,000 acres. The average condition of spring wheat was put at 91·4; last year it was 100·9. The average condition of winter wheat was only 67·3, as compared with 76·2 on the 1st May last, and 90·8 on 1st June, 1898. Bearing in mind that this average value relates strictly to the acreage still under cultivation, after eliminating some 4,000,000 acres of winterkilled wheat, the condition is unusually low. The area under winter wheat was estimated on 1st May at 25,900,000 acres, about 160,000 acres more than was actually harvested last year. The total under wheat this year is accordingly considered to be about 44,000,000 acres.

The acreage reported to have been sown to oats is about 0·7 per cent. less than last year. The general average condition is 88·7; in 1898 it was put at 98. The acreage under barley had increased by 3·1 per cent.; its condition is also much better than last year, being represented by 91·4 as against 78·8. Rye shows a decrease of 8·9 per cent. in area; its prospects are not so good as at the same period in 1898 (84·5 only, as against 97·1).

CROPS IN INDIA.

The second general memorandum on the wheat crop of India for the season 1898-99 was published in March last.

As regards the Panjab a deficiency of 6 per cent. in the

area compared with last year was estimated, but with a slight excess over the average. The yield of the irrigated crop was expected to be normal; but that of the unirrigated crop, covering about 52 per cent. of the area under wheat, was 25 per cent. below the normal. The winter rains having been favourable in the North-Western Provinces and Oudh, an out-turn of 75 to 85 per cent. of a full normal crop was expected if the season continued favourable. In Bengal a yield equivalent to 105 per cent. of a normal crop was anticipated on an area 1·3 per cent. greater than last year's and slightly above the average. Owing to deficient rainfall in the Central Provinces the recovery from the contraction of wheat cultivation caused by the late famine had been slow, and with an addition of 200,000 acres there was still a deficiency of 36 per cent. compared with the average cultivation of the preceding ten years. The condition of the crop had deteriorated in the early part of the year, and the out-turn was estimated at about two-thirds of a normal yield. Unfavourable inundation had caused a great falling off in Sind, where the area under wheat was little more than half last year's area and 40 per cent. below the average. The cultivation in the Deccan and Karnatak districts had not yet recovered from the check caused by the famine, and for the whole of the Bombay Presidency (including Sind) the area was 9 per cent. less than last year's area and 17 per cent. below the average. The crop suffered from excessive cold in Gujarat, and in parts of the Deccan and Karnatak from deficiency of moisture and cloudy weather, but elsewhere it was fairly good. The area sown in Berar was nearly 18 per cent. greater than in 1897-98, but still very much below the average. Owing to deficient rainfall conditions had not improved, and the yield was expected to be rather less than half a normal crop. The cultivation in the Nizam's Territory was above the average and 9·6 per cent. greater than last year's area. The yield was estimated at 64 per cent. of a normal crop, which is about equal to the average of recent years. According to the final report on the wheat crop of Bengal, the area in 1898-99 was 1,594,600 acres, against

1,569,500 acres in 1897-98, and the out-turn is estimated at 666,800 tons as compared with 592,600 tons.

CROPS IN AUSTRIA.

The official report upon the condition of the crops in Austria at the middle of May, received through the Foreign Office, states that vegetation had been retarded by the backward character of the season, cold weather lasting till the first week in May. Warmth and rain had, however, then set in, and agricultural prospects were much improved thereby.

Wheat was said to be everywhere in very fine condition, and in some places so luxuriant as to require thinning. Rye had suffered most from the unseasonable weather, and was generally poor and weak. Barley gave fair promise, although it had been somewhat damaged by weeds and insects. Maize was backward, but its ultimate prospects were satisfactory. Rape seed in Moravia and Bohemia was poor and stunted, while in other districts it could only be classed as average. Clover and grass, thanks to the rains of May, gave promise of a good, if rather late, crop. The sowing of sugar-beet was completed, but the plants were only developing slowly, while in places they had to contend with drought and weeds. Hops and vines were backward. Peaches, cherries, apples, and nuts were disappointing, but pears were likely to yield a good crop; damsons in Moravia, and olives in Dalmatia, were reported to be satisfactory.

THE AUSTRIAN HARVEST OF 1898.

The Ministry of Agriculture at Vienna has published the annual statistics relating to the principal grain crops in

Austria during the past year. The figures together with those for 1897 are given in the following table :

CROPS.	AREA.		YIELD.	
	1898.	1897.	1898.	1897.
	Acres.	Acres.	Bushels.	Bushels.
Wheat - -	2,608,200	2,614,000	45,893,000	34,750,600
Rye - - -	4,511,700	4,541,600	79,097,200	63,792,800
Barley - -	2,884,800	2,898,000	58,187,200	48,218,300
Oats - - -	4,695,900	4,722,100	110,660,200	93,192,400
Maize - - -	836,700	829,400	15,475,800	14,316,900

The area of land cultivated for agricultural purposes is returned at 26,273,000 acres, of which 15,537,300 acres, or about 59 per cent., are occupied by the five cereal crops enumerated above. The area devoted to these crops, which has been declining for some years, shows a further decline of 67,800 acres. With regard to the production, the output, as will be seen, was in each case considerably above that of 1897, which, however, was below the average of the previous ten years. The yield of 1898, on the other hand exceeded the average except in the case of maize, which was about normal. The aggregate cereal yield was about 309,313,400 bushels, as compared with 254,271,000 bushels in 1897.

CROPS IN HUNGARY.

Reports from official sources, received through the Foreign Office, indicate that the weather in Hungary had varied considerably in different parts of the kingdom. Where rain had been plentiful (chiefly in the east and west) the crops were vigorous, but in the districts where drought had prevailed their poor and backward condition gave cause for anxiety. In places frost had damaged vines, and in some instances fruit trees and grain. The winter had generally been dry.

Wheat, at the end of April, was on the whole satisfactory, and in some districts gave promise of unusual excellence.

Rye was much less vigorous, and in many districts, owing to the cold, dry weather, was distinctly poor. Barley on the whole may be considered satisfactory, though it had suffered here and there from grubs, weeds, and frosts, and was not in such good condition as it had been a month earlier; while maize was not promising and stood in urgent need of rain and milder weather. March frosts and insects had worked such havoc among the rape seed that it had in many places to be ploughed up: the prospects for the harvest were consequently poor. Beet, which had at one time been injured by insects, was improving rapidly.

Later reports indicate that the condition of wheat and rye was somewhat less satisfactory at the end of May. An average harvest only of winter wheat was expected, although a little better than last year: an out-turn of about 17,300,000 qrs., or 17 to 18 bushels per acre, was looked for. Rye might still improve with better weather. Barley had been damaged by rain, and not more than an average yield was expected; the same applies to oats.

CROPS IN FRANCE.

An official report on the condition of the French crops on the 10th May, 1899, was published in the *Journal Officiel* at the end of that month.

The appearance of winter wheat was stated to be "very good" in 16 departments, "good" in 63, "fairly good" in 6, and "passable" in the remaining 1 department. The area sown was of the same extent as in 1898 in 48 departments, in 21 it was larger, and in 17 smaller, than last year's acreage. Spring wheat had been sown in 46 departments only, and in a reduced area in 10 of them. The condition was reported "very good" in 5 cases, "good" in 36, and "fairly good" in the remaining 5 departments.

The potato fields were not in a satisfactory state in 4 of the 46 departments where the plants were "up," but the acreage was, on the other hand, considerably greater than in 1897-8.

The official report as a whole was good, and a further improvement has since taken place.

RUSSIAN HARVEST OF 1898.

Particulars of the preliminary estimates of the results of the harvest of 1898 in Russia and Poland have already been published in the issues of this Journal for December and March last. The Central Statistical Committee have since published complete details of the yields of the principal crops in the seventy-two governments of the Empire. According to these returns the acreage and production of the chief cereals and of potatoes in 1898 is estimated to have been as under :—

Acreage, 1898.

Governments.	Wheat.	Rye.	Barley.	Oats.	Potatoes.
	Acres.	Acres.	Acres.	Acres.	Acres.
50 European Governments - - -	36,011,500	62,290,300	17,591,800	35,662,500	6,571,700
10 Polish Governments - - -	1,221,100	4,812,900	1,047,100	2,512,200	1,930,250
4 Caucasian Governments - - -	5,263,750	554,900	1,444,600	609,500	184,600
4 Siberian Governments - - -	3,377,250	2,350,200	375,400	2,555,800	146,150
4 Asiatic Governments - - -	1,150,150	73,800	148,400	317,700	13,530
Total - - -	47,023,750	70,082,100	20,607,300	41,657,700	8,846,230

Production, 1898.

Governments.	Wheat	Rye.	Barley.	Oats.	Potatoes.
	Qrs.	Qrs.	Qrs.	Qrs.	Tons.
50 European Governments - - -	41,650,200	74,022,700	30,468,800	57,248,400	16,671,800
10 Polish Governments - - -	2,703,000	8,377,200	2,330,300	5,676,100	6,180,900
4 Caucasian Governments - - -	6,511,000	648,000	3,003,500	1,269,500	363,200
4 Siberian Governments - - -	4,505,500	2,631,500	586,600	5,240,800	325,900
4 Asiatic Governments - - -	1,862,100	93,600	326,400	861,200	29,500
Total - - -	57,231,800	85,773,000	36,715,600	70,296,000	23,571,300

It will be noted that the above figures apply to 72 governments, whereas in former years the returns have related to 71 governments. The additional government now included is the district of Tchernomorskaia in the Caucasus, but the area under cultivation in this district is at present so small that it does not materially affect the comparability of the total figures with those for 1897. The computed areas

and yields of the crops mentioned above in the Tchernomorskaia government last year were as follows :—

	Acres.	Qrs.
Wheat - -	10,590	11,940
Rye - -	570	670
Barley - -	490	810
Oats - -	870	1,760
		Tons.
Potatoes - -	1,900	3,670

For purposes of comparison it may be useful to reproduce the estimates of the acreage and yields of these crops in the Russian Empire in 1897. These were returned by the Central Statistical Committee as follows :—

Acreage, 1897.

Governments.	Wheat.	Rye.	Barley.	Oats.	Potatoes.
	Acres.	Acres.	Acres.	Acres.	Acres.
50 European Governments - - -	35,610,278	62,653,557	17,220,711	36,210,478	6,328,257
10 Polish Governments - - -	1,210,559	4,788,455	1,045,283	2,506,345	1,916,025
3 Caucasian Governments - - -	5,589,394	570,642	1,485,678	715,451	166,169
4 Siberian Governments - - -	3,121,392	2,558,353	356,500	2,394,506	151,189
4 Asiatic Governments - - -	1,206,270	90,137	152,588	395,912	17,486
Total - - -	46,738,393	70,461,144	20,260,760	42,222,692	8,579,720

Production, 1897.

Governments.	Wheat.	Rye.	Barley.	Oats.	Potatoes.
	Qrs.	Qrs.	Qrs.	Qrs.	Tons.
50 European Governments - - -	29,726,430	65,997,710	24,327,360	55,960,510	15,694,580
10 Polish Governments - - -	2,219,050	6,306,830	1,910,020	4,251,800	5,814,750
3 Caucasian Governments - - -	3,723,760	437,140	1,339,310	684,520	233,090
4 Siberian Governments - - -	5,337,670	3,255,820	732,010	6,088,650	419,410
4 Asiatic Governments - - -	1,381,580	96,820	248,930	875,130	35,380
Total - - -	42,388,490	76,094,320	28,548,680	67,860,610	22,197,210

CROPS IN GERMANY.

The latest official report on the crops in Germany states that continuous cold, wet, and night frosts at the end of April and the beginning of May had kept back vegetation and hindered spring work, besides doing some harm ; some good had, however, been done, as these conditions had checked the field-mice, which this year appear to threaten

considerable trouble. Better weather set in later, and the crops derived much benefit therefrom.

Improvement was recorded during the month in the case of winter corn, but the condition of the rye was not so good as at the same date last year. It had suffered more than wheat from field-mice, although considerable tracts under the latter grain have had to be ploughed under owing to attacks by these rodents. The condition of both wheat and rye was returned as between middling and good. The sowing of spring corn had been greatly hindered by wet; in many places it had not been completed, and a small proportion only of the young plants were showing above ground.

A considerable amount of land under clover had been damaged by field-mice; as much as 28 per cent. of the clover area having been ploughed under from this cause in the district of Breslau, and 18 per cent. in the kingdom of Saxony, while many other districts had also suffered severely. Better weather had, however, improved the prospects of this crop, which were reported as middling to good. Grass, in hill regions, had come on well, and promised a good cut; that in the neighbourhood of watercourses had often suffered from inundations, and was generally backward. The prospects in May were, however, distinctly better than in April.

CROPS IN ROUMANIA.

Reports received through the Foreign office indicate that, owing to the prolonged drought which has prevailed in Roumania, the condition of the crops, except in a few localities, left much to be desired. Advices from most of the wheat-growing districts gave very unfavourable descriptions of the crops, and in some districts the wheat had been ploughed up and maize planted in its stead. A certain quantity of rain had fallen lately, but insufficient for the requirements of the growing plants.

Generally speaking, it might be said that in Northern Moldavia and in the districts lying between Turn Severin and Slatina the prospects of the harvest were fair, whereas in the other parts of the country only poor returns could at best be expected.

ROUMANIAN HARVEST OF 1898.

Brief particulars of the yield of wheat, oats, barley, and rye in Roumania in 1898 were published in the Journal for September last (Vol. V., p. 260). These data can now be supplemented by information recently published and transmitted through the Foreign Office concerning the other principal crops cultivated in that country.

The acreage under maize was 5,237,000 acres, and the production 98,758,000 bushels, or at the rate of 18.9 bushels per acre. Area, production, and yield per acre were all higher than in any of the previous five years. Under millet there were 232,000 acres; this area as well as the production (2,743,000 bushels), being above the average of the preceding five years; but this crop appears liable to very large fluctuations, the yield per acre having varied since 1893 between 0.7 and 18 bushels per acre.

Among minor crops sugar-beet shows an area more than double that of 1897 (15,000 acres as against 7,000); while potatoes increased from 31,600 acres in 1897 to 41,000 acres in 1898. The yield per acre of both these crops was also some 50 per cent. better than in the previous year; the total production in 1898 amounting to 3,181,000 cwts. of sugar-beet and 2,161,000 cwts. of potatoes. Colza and tobacco show a comparatively large decrease in area, while beans increased and covered 134,000 acres in 1898.

The area under artificial grasses was returned at 183,000 acres, that under natural grass at 1,390,000 acres; these figures not differing very materially from the acreage of preceding years, though artificial grasses show rather wide variations from year to year. The total area under all crops returned amounted to 13,793,000 acres as compared with 13,620,000 acres in 1897.

CROPS IN ITALY.

According to the report appearing in the "Rivista Meteorico-Agraria," issued by the Italian Ministry of Agriculture, the condition of crops in Italy in the first fortnight of May last was generally satisfactory. Wheat plants were flourishing everywhere, and vines and olives were promising.

THE ARGENTINE WHEAT HARVEST OF 1898-99.

In the Foreign Office report on the trade of the Argentine Republic for 1898 Mr. Acting-Consul Laing observes that the year 1898 was a good average one for Argentine agriculture, and the price of wheat ruled good. A splendid crop of wheat for the harvest of 1898-99 has been safely harvested and stocked. It is very difficult to forecast the wheat crop, but at the time of writing, viz., March, 1899, Mr. Laing thought that a surplus of at least 1,250,000 to 1,500,000 tons might safely be reckoned as available for export during 1899, after allowing for that needed for home consumption and seed.

The following table is of interest in showing the calculations of the crop and its yield per acre during the last eight years:—

Year.	Export : Wheat and Flour.	Consumption : Flour and Seed Wheat.	Total Crop.	Area.	Yield per Acre.
	Tons.	Tons.	Tons.	Acres.	Bushels.
1890-91	405,000	440,000	845,000	2,700,000	12
1891-92	495,000	485,000	980,000	3,300,000	11
1892-93	1,050,000	535,000	1,585,000	4,000,000	14½
1893-94	1,655,000	575,000	2,240,000	4,600,000	18
1894-95	1,055,000	590,000	1,675,000	5,000,000	12
1895-96	623,000	600,000	1,223,000	5,000,000	9
1896-97	136,000	600,000	736,000	5,000,000	5½
1897-98	770,000	630,000	1,400,000	5,000,000	10
Average of 8 years.	...	...	...	...	11½
1898-99 (estimated)	2,050,000	650,000	2,700,000	5,500,000	18

Foreign Office Report, No. 2219. (Price 2d.)

THE VICTORIAN WHEAT HARVEST OF 1898-99.

According to the preliminary returns prepared by the Assistant Government Statist relating to the wheat harvest in Victoria in 1898-99, the total area from which wheat was harvested was 2,079,410 acres, and the produce was 19,557,532 bushels, or an average yield of 9.41 bushels per acre. In the previous year, 1897-98, the area was 1,657,450 acres, and the produce 10,580,217 bushels; the

increase in yield, therefore, in the current year is nearly nine million bushels.

THE NEW ZEALAND HARVEST OF 1898-99.

The interim report of the New Zealand Agricultural Department gives particulars of the areas under cereals in the colony in 1898-99, with their estimated yield. From this it appears that the area under wheat in the present year was 395,536 acres, as compared with 315,801 acres in 1898; whilst the out-turn is put at no less than 10,679,472 bushels, representing a yield of 27 bushels per acre. The yield for the preceding three years has been about 6,150,000 bushels per annum or, on a smaller area, a yield of 23 bushels per acre. The quantity of wheat on hand on the 15th November, 1898, is given as 1,590,461 bushels, which with the present harvest makes a total of 12,269,933 bushels. The Secretary for Agriculture estimates the home consumption at 4,800,000 bushels, which, with 800,000 bushels for seed, leaves a surplus of 6,670,000 bushels.

The returns for barley and oats are also very satisfactory; the yield of oats being 14,488,705 bushels from 413,963 acres, and of barley 1,296,344 bushels from 46,298 acres. It was feared at one time that the crops had suffered from wet and stormy weather, but the inquiries made by the Department have shown that the damage was on the whole unimportant and chiefly affected North Island, whereas 90 per cent. of the wheat and oats are grown in the south.

PARLIAMENTARY PUBLICATIONS.

Board of Agriculture.—Agricultural Returns for Great Britain, 1898. [C. 9304.] Price 1s. 5d.

This annual volume, comprising 255 pages of tables, in addition to an explanatory report, completes and amplifies the information already published by instalments, either separately or in this Journal, as to the acreage and produce of crops, and the numbers of live stock, in Great Britain last year, with further data for Ireland, the Isle of Man, and the Channel Islands, and summaries for the whole of the United Kingdom. The statistics of 1898 are the subject of various analytical tables, and comparative figures covering the period since 1871 are given for each division of the United Kingdom. Other statements supply detailed information of the trade in live stock with Ireland, the supply of meat and produce at the London markets, the prices of corn and meat, the quantities and values of the imports and exports of agricultural produce, together with the available statistics of agriculture in the colonies and in foreign countries.

The information as to crops and live stock in Great Britain was abstracted from 519,762 schedules, representing the holdings of all persons occupying more than one acre, and 13,077 schedules from owners of stock who either occupied no land or whose holdings did not exceed one acre. The extent to which estimates have to be resorted to in consequence of the non-return of the schedules is now very small, more than 96 per cent. of the cultivated area of Great Britain being accounted for by the statements of the occupiers themselves. Of the total area of land and water in Great Britain, which is given as 56,772,000 acres, 32,477,000 acres are

accounted for in detail under the various headings which make up the category of cultivated land for the purposes of these returns. Of the remaining area 12,857,000 acres are estimated to be utilised as grazings of mountain or heath land, while, according to the special returns last collected in 1895, woods and plantations account for 2,726,000 acres more.

Major Craigie, in his prefatory report, points out that the returns for 1898 show that the familiar movement in the direction of reducing the land under the plough was resumed after its slight and temporary check in the preceding year, and it is noted that the decrease of 90,000 acres in the arable land was perhaps the more remarkable in a year when there was a marked increase in the area of the wheat crop. The distribution of the acreage and numbers of the live stock in 1898 have already been shown in this Journal, but means are now afforded in the volume just issued for various comparisons as to the relation of arable land and of wheat acreage to the total cultivated area in each county, and the numbers of each class of enumerated live stock per 1,000 acres of total area.

The returns of the produce of crops, which were briefly summarised in the last number of the Journal, are now shown in full detail for each county, and the yield of the crops of the past season and of each of the last ten years is compared with the estimated average yield over the ten-year period 1888-97, by a table which directs attention to the bountiful character of last year's harvest. The local variations in the yield of wheat in 1898 form the subject of special comment in the report, and it is observed that they go far to explain the objections sometimes urged against preliminary and general estimates for the whole country, which, it is obvious, cannot reflect the experience of every district alike. In connection with the figures which go to prove the general productiveness of the season of 1898, some brief notes are for the first time given, describing the salient meteorological features of the year, and it is noted that the mean rainfall was the lowest recorded since 1893, while the mean temperature was exceptionally high.

It is recognised that a prominent fact in the agricultural history of one portion of the year 1898 was the rise which occurred in the price of wheat, and this is examined at some length from the statistical point of view, and as to the extent to which a rise of this nature, occurring as it did so late in the cereal year, affected the interests of British wheat farmers. The fluctuations in the price of British wheat for each quarter of the six years 1893-98 inclusive are compared with the varying imports of wheat and flour into the United Kingdom in each period, distinguishing the supplies coming from sources of supply so irregular as Argentina and India respectively. This section of the report is illustrated by a diagram. The general average price of wheat, 34s., for the year 1898 was the highest recorded since 1884, with one exception, that of 1891, when it was 37s., but the range between the highest and lowest weekly average was from 48s. 1d. (in May) to 25s. 5d. (in September), and was greater than had been recorded in any year since 1868.

Quotations of the prices of meat, all tending in the direction of lower values in 1898, are supplied from the markets of London, Liverpool, and Glasgow, and the prices of fat cattle at twelve of the chief live stock markets scheduled under the Weighing of Cattle Act are tabulated for reference; while a new table is added, giving, for comparison, the quotations for various classes of dead meat at the London Central Market for the past three years.

The section of the returns devoted to statistics of agricultural imports contains information for a series of years. An increase, measured by value, of nearly £14,000,000 occurred, it is shown, in 1898 over 1897 in the imports of grain, flour, fruit, vegetables, dead meat, and other miscellaneous animal produce; and although there was a slight reduction in the imports of dairy products and live animals, this diminution, on the other hand, amounted to less than £2,000,000.

Major Craigie states that he has been able to obtain from the official colonial reports, and with the co-operation of the agents-general of most of the several Australasian colonies, much more complete and detailed statistics of the areas and

production of New South Wales, Queensland, South Australia, Victoria, West Australia, New Zealand, and Tasmania than have been available in former years, while the figures for such provinces of Canada as supply information have also been extended. Among the tables relating to foreign countries it is noted that the completion of the long-delayed Belgian Agricultural Census of 1895 has permitted a considerable extension and correction of the information previously available as to the crops and live stock of Belgium. The report concludes with a comparative review of the recent changes in grain areas and grain production, and in the number of live stock enumerated in the various foreign countries whence official information has been received in time to be summarised in the final tables of the volume of Agricultural Returns.

Agricultural Rates, Congested Districts, and Borough Land Tax Relief (Scotland) Act, 1896. Valuation and Amounts Certified and Annual Amounts Distributed. [C. 9173.] Price 1s. 1d.

From this return it appears that a sum of £183,303 was distributed out of the Local Taxation (Scotland) Account under this Act, of which £15,000 was for the improvement of congested districts in the Highlands and Islands. Details of the valuation in each parish and county for rates are given, together with the amounts paid over; the total paid to county councils was £62,455, and to parish councils £97,858; £7,990 being paid to the Commissioners of Inland Revenue and to burghs in respect of land tax. The total valuation of parishes in each county for the purpose of poor rate amounted to £25,156,454, of which £5,783,489 represented the total valuation of agricultural lands and heritages.

Report of the Committee of Council on Education in Scotland, 1898-99. [C. 9307.] Price 4d.

One form of technical instruction which is specially provided for in Scotland by the Technical Instruction Amend-

ment Act, 1892, relates to agriculture. In this report it is stated that some Scotch county councils, notably those of the south-west of Scotland, have contributed largely from their funds towards the support of agricultural education in various forms, and have given liberal assistance both directly and indirectly toward such central institutions as the Agricultural Department of the Glasgow and West of Scotland Technical College and the Kilmarnock Dairy School. Many counties however, appear to have done nothing for the encouragement of agricultural education, while others have confined their efforts to such instruction of a comparatively valueless nature as is given in connection with evening continuation schools. The special grant of £2,000 voted for agricultural education in Scotland, and now administered by the Scotch Education Department, has been distributed in various amounts to four institutions, viz., the Edinburgh School of Rural Economy, the Agricultural Departments of Aberdeen University and of the Glasgow and West of Scotland Technical College, and the Kilmarnock Dairy School, which institutions may be expected to have a wide sphere of activity in their special districts. The Committee report that they have every reason to suppose that good work has been done in connection with each of these institutions, but that they would desire to see some or all of them more fully equipped, and their sphere of activity more widely extended, so that they may be in a position to exercise a more decided influence on the progress of agriculture in Scotland. The funds at the disposal of the Department are not sufficient by themselves to meet this purpose, and the Committee are of opinion that much better results might be obtained if the grants which they are able to make to these institutions were more largely reinforced by contributions from the various local authorities interested. They have accordingly welcomed the proposals by certain county councils for the establishment of an independent Agricultural College in the West of Scotland, which should give facilities for the most thorough and highly developed instruction in agriculture to those students who are able to devote a considerable time to this study, and should at the same time be a means of bringing home to the agricultural population

of the districts concerned the latest results of agricultural research. The scheme put forward by the Department for the establishment of such a college has now been accepted by various county councils who were asked to assist in its establishment, and from all of these promises of support, in some cases of a very substantial amount, have been received. The Committee entertain good hope of the success of the scheme, notwithstanding the fact that under the present conditions of the administration of local funds for technical education it is difficult to obtain any guarantee of permanent support from local authorities, and the college must for the present be largely dependent on the goodwill and hearty co-operation of the various contributors.

The following table shows the amounts received by each of the institutions which have shared in the Department's grant for agricultural education in Scotland for the past two years:—

INSTITUTIONS.	SUMS PAID.		
	1896-97.	1897-98.	1898-99.
	£ s. d.	£ s. d.	£ s. d.
Aberdeen University (Agricultural Department) - -	300 0 0	295 0 0	295 0 0
Edinburgh School of Rural Economy - - -	580 0 0	570 0 0	570 0 0
Glasgow and West of Scotland Technical College -	751 18 5	751 2 5	750 16 8
Kilmarnock Scottish Dairy Institution - - -	300 0 0	299 0 0	295 0 0
Expenses of Inspection, etc. -	68 1 7	84 17 7	89 3 4
Total - -	£2,000 0 0	£2,000 0 0	£2,000 0 0

Brewers' Licences. [H.C. 127.] Price 2½d.

According to this return the number of persons licensed as brewers for sale in the United Kingdom in the year ended 30th September, 1898, was 7,388, and the number of licences issued was 7,530. The number of persons licensed as brewers not for sale was 14,492, and of these 11,370 were private brewers not liable to beer duty. The total amount of

licence duty paid in the year was £11,514, and the amount of beer duty charged was £12,143,482. The quantities of materials used by brewers for sale included 57,468,514 bushels of malt, 131,279 bushels of unmalted corn, 927,036 cwts. of rice, flaked maize, and similar preparations, and 2,773,512 cwts. of sugar, including its equivalent of syrups, glucose, and saccharum.

Board of Agriculture.—Annual Report of Proceedings under the Tithe and other Acts administered in the Land Division for the Year 1893. [C. 9209.] Price 1½d.

In their previous report the Board drew attention to the expansion in the work devolving upon them under the various Acts relating to tithe rent-charge. The past year has shown no diminution in the rate of increase, the number of applications under these Acts being 1,034, as compared with 853 in 1897. The enfranchisements of copyhold land which were confirmed by the Board also show an increase, the number being 393, as compared with 323 in 1897. In both cases the figures for 1898 were considerably in excess of those for the preceding ten years.

Under the Inclosure Acts, 1845 to 1882, provisional orders for the regulation of Wolstanton Marsh, 31 acres, in the neighbourhood of the Staffordshire Potteries, and Runcorn Heath and Hill, 79 acres, were confirmed by Parliament. The commons referred to will be preserved as open spaces under the management of the respective district councils. During the year the award in the matter of the inclosure of the open fields, etc., in the parishes of Castor and Ailsworth, Northamptonshire, was confirmed by the Board. By this award 42 acres of good land, well situated, were allotted for field-gardens for the poor inhabitants, and 44 acres were set out as public recreation grounds. Under the Law of Commons Amendment Act, 1893, the consent of the Board was given to the inclosure of half an acre of Cookham Dean Common to provide a site for a school. Thirty-eight orders

of exchange were confirmed in 1898, as compared with twenty-seven orders in 1897.

Under the Metropolitan Commons Acts, 1866 to 1898, a scheme with regard to Harrow Weald Common was, after full inquiry, approved and certified by the Board.

Under the Universities and College Estates Acts, 1858 to 1898, 164 applications were received, and an Act to amend the University and College Estates Acts was passed in 1898, giving effect to the recommendations of a Departmental Committee which sat in the previous year.

Eighty-four applications were dealt with under the Glebe Lands Act, and 176 applications under the Drainage and Improvement of Land Acts. Under the Land Drainage Act, 1861, the sanction of the Board was given to proposals for mortgages of rates in seven districts to the amount of £7,650; nearly all these loans were required for the repair of sea-walls which had been destroyed by the great storm of November 29th, 1897.

The promoters of the Welshpool and Llanfair Light Railway being desirous of obtaining a special advance from the Treasury, made application to the Board for a certificate as required by Section 5 (1) of the Light Railways Act. The Board were satisfied that such a railway would benefit agriculture in the district, but that owing to the exceptional circumstances it would not be constructed without special assistance from the State, and they gave their certificate accordingly.

Returns showing the Allocation and Application of the Contributions out of the Local Taxation (Scotland) Account, 1894-5 and 1895-6. [C. 8574.] Price 5d.

These returns show, in Part I., the contributions to counties, burghs, and police burghs in Scotland from the Residue Grant and Equivalent Grant, and the purposes to which the local authorities applied the sums received from these sources during the two years 1894-5 and 1895-6. The total received from these two grants amounted to £170,606 in 1895-6, and of this

sum £28,832 was applied to technical education, and £137,021 to relief of rates.

Part II. is a summary of the total payments into and out of the Local Taxation (Scotland) Account for the same years.

Local Authorities in Scotland (Technical Education), 1896-7 and 1897-8. [H.C. 368.] Price 9d.

This is a return showing the extent to which, and the manner in which, local authorities in Scotland have allocated and applied funds to the purposes of technical education during each of the two years ended respectively on the 15th day of May, 1897, and the 15th day of May, 1898, under the following Acts: Local Taxation (Customs and Excise) Act, 1890; Education and Local Taxation Account (Scotland) Act, 1892; Technical Schools (Scotland) Act, 1887; Technical Instruction Amendment (Scotland) Act, 1892; and Public Libraries Acts.

The total amount of the residue paid to the county councils, town councils of burghs, and commissioners of police burghs in respect of the year 1896-97 was £48,073, as against £38,262 in the previous year. The proportion spent on technical education was £32,600 in 1897-98, compared with £28,738 in 1896-7, the balance being in each case devoted to relief of rates. In the latter period 27 out of the 33 county councils applied the whole of the residue to technical education, and four a part of it, while two applied the whole of the residue to relief of rates. Of the 205 burghs and police burghs, 60 applied the whole and 58 a part of the residue to technical education, and 87 applied the whole to relief of rates. Nothing was applied to the building or maintenance of science and art schools, art galleries, or museums, out of the local rate under the Public Libraries Acts. The total amount expended on technical education during the year 1897-98, including balance in hand and contributions under Section 2 (5c) of the Education and Local Taxation Account (Scotland) Act, 1892 was £34,591, and the amount handed over to secondary education committees was £6,258,

compared respectively with £33,442 and £6,290 in the previous year.

Agricultural Statistics, Ireland.—Tables showing the Extent in statute acres and the Produce of the Crops for the Year 1898.

[C. 9004.] Price 2½d.

The area and produce of the principal crops in Ireland in 1898 are given as follows:—

	AREA.		PRODUCTION.	
	1898.	1897.	1898.	1897.
	Acres.	Acres.	Cwts.	Cwts.
Wheat - - -	52,798	47,235	994,513	726,021
Oats - - -	1,165,359	1,175,118	18,684,258	16,264,733
Barley and Bere -	158,161	170,652	2,981,637	2,589,013
Rye - - -	12,389	13,058	157,968	141,593
			Tons.	Tons.
Potatoes - - -	664,864	677,216	2,942,263	1,498,416
Turnips - - -	306,929	308,966	5,162,886	4,133,585
Mangel Wurzel and Beet Root -	55,955	54,649	1,009,573	751,056
Flax - - -	34,469	45,537	6,724	7,272
Hay : Clover and Rotation Grasses -	652,040	637,128	1,527,630	1,434,686
Hay : Permanent Pasture -	1,522,430	1,539,014	3,749,993	3,653,231

The acreage under wheat is larger than in 1897 by 5,563 acres, but that of the other chief crops showed a decline, with the exception of the area under clover, sainfoin, and rotation grasses, which increased by 14,912 acres. The production, however, as will be seen from the above table, was in all cases, except flax, greater than in the preceding year.

With regard to the potato crop, the acreage was 75,000 acres below the average for the 10 years 1888-97, and 12,352 acres less than in 1897. Of the total area under this crop 465,731 acres, or 70 per cent., are returned as occupied by the "Champion" variety. For 12 years from 1883 to 1894 this variety occupied from 78 to 80 per cent. of the potato acreage, but since the year 1891, when it stood at 79·7 per cent. it has steadily declined, so that whilst the total acreage has fallen by 88,468 acres, the area under this particular variety has decreased by no less than 134,672 acres.

Colonial Bounties on Agricultural Produce. [H. C. 144.]Price $\frac{1}{2}$ d.

This is a return issued by the Colonial Office, showing the British colonies which pay bounties on the export of agricultural produce, and defining the commodities on which such bounties are paid, and the amounts under each heading, as under :—

Colony.	Commodity.	Rate of Bounty or Bonus.
Victoria - - -	Green fruit - - -	1s. per case of approved quality.
Victoria - - -	Fruit pulp - - -	$\frac{1}{2}$ d. per lb. of approved quality.
Queensland - - -	Chilled meat exported to the Southern Colonies.	$\frac{1}{4}$ d. per lb.
Queensland - - -	Wool sold by public auction by the Brisbane Woolbrokers' Association (the greater part of which is subsequently exported).	£1 per ton.

In a note of the Secretary for Agriculture of the Colony of Victoria, dated 11th October, 1898, it is stated that it is proposed, in addition to the bounties specified in the return, shortly to offer a bonus in that colony on the export of honey, tobacco, cheese, flax, and hemp, with a view to encourage an export trade in these commodities; but that up to that date the rates had not been definitely decided upon.

PRICES OF LIVE STOCK.

RETURNED UNDER THE WEIGHING OF CATTLE ACT.

In the number of this Journal for March last summaries were given of the returns collected during the year 1898 under the Markets and Fairs (Weighing of Cattle) Act in Great Britain, with a serial statement showing the slow but gradual growth in the number of animals weighed and priced at the markets scheduled under the statute since these statistics were first obtained in 1893. The data for the first quarter of 1899 are now available, 283,000 cattle, 746,000 sheep, and 110,000 pigs having been returned as entering the markets or marts of the 21 places now scheduled in the three months ending March 31, 1899. Of these animals the numbers weighed and priced are indicated in the following statement, with comparative figures for the first quarter of the preceding year:—

Animals.	1st Quarter, 1899.	1st Quarter, 1898.
CATTLE :	No.	No.
Entering markets - - - -	282,696	275,588
Weighed - - - -	33,067	31,073
Prices returned - - - -	29,690	27,953
Prices returned with quality distinguished - - - -	25,020	23,668
SHEEP :		
Entering markets - - - -	746,113	758,922
Weighed - - - -	9,699	11,237
Prices returned with quality distinguished - - - -	8,707	8,762
SWINE :		
Entering markets - - - -	110,244	80,904
Weighed - - - -	325	349
Prices returned with quality distinguished - - - -	325	231

The number of cattle entering the markets was thus greater than was the case a year ago, while a still greater relative

increase is shown in those weighed and priced. Fewer sheep seem to have appeared at the markets than in the corresponding period of 1898, and the number weighed and priced remains relatively insignificant. There was a marked increase in the total number of swine exposed at these 21 markets of Great Britain during the past quarter, but in the sale of these animals the use of the weighbridge is rarely resorted to. In Bristol and York not a single animal was returned as weighed during the three months, and no quotations of price were supplied from Ashford, Norwich, or Salford.

As usual, the reports from Scotland are, as regards weighing of stock, greatly in advance of those from England, the total number weighed and priced in the three months being in the former country 16,516, or upwards of 25 per cent. of the number entering the markets, while in England the corresponding figures were 8,504 head, or less than 4 per cent.

For the purpose of price records the returns from the twelve places—six in England and six in Scotland—from whence data of sufficient importance are obtained are again tabulated as follows :—

PLACES.	INFERIOR or Third Quality.			GOOD or Second Quality.			PRIME or First Quality.		
	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.
Carlisle - -	679	<i>s. d.</i> 3 4	<i>s. d.</i> 26 8	866	<i>s. d.</i> 3 9½	30 4	1,056	<i>s. d.</i> 4 1½	<i>s. d.</i> 33 0
Leeds - -	8	3 6	28 0	62	3 7½	28 10	365	4 0	32 0
Liverpool - -	150	3 0½	24 4	143	3 7½	29 0	1,257	4 2	33 4
London - -	7	3 3½	26 4	192	4 3½	34 4	1,135	4 9	38 0
Newcastle - -	19	3 6½	28 4	24	4 0½	32 4	780	4 4½	34 10
Shrewsbury - -	13	3 8½	29 8	36	4 1½	32 10	46	4 4	34 8
Aberdeen - -	1,219	3 1½	25 0	2,447	4 0½	32 4	2,189	4 4½	35 0
Dundee - -	162	3 5	27 4	1,488	4 0½	32 2	928	4 3½	34 4
Edinburgh - -	—	—	—	2,764	4 2½	33 10	185	4 4½	34 10
Falkirk - -	26	3 8	29 4	293	4 1	32 8	687	4 2½	33 10
Glasgow - -	318	3 11	31 4	1,392	4 1	32 8	1,776	4 4½	34 10
Perth - -	31	3 10	30 8	139	4 0½	32 2	364	4 3½	34 4

These figures relate to fat cattle only, stores being excluded in their compilation. The range of prices at the

various markets is considerable. For prime cattle Leeds had an average for the quarter of 4s. per stone (32s. per cwt.), and London 4s. 9d. per stone (38s. per cwt.). A similar contrast is shown in the case of second quality beasts, Leeds having an average of 3s. 7 $\frac{1}{4}$ d. per stone (28s. 10d. per cwt.); while London reached an average of 4s. 3 $\frac{1}{2}$ d. per stone (34s. 4d. per cwt.), or considerably more than the price for cattle graded at Leeds as of first quality.

An indication of the general tendency of the price of fat cattle during each month may be obtained by calculating the weight and actual value of all the cattle of each grade weighed and priced at the twelve places above enumerated. Eliminating the third quality on account of the insufficiency of the data, the number of cattle weighed in the "inferior" class being again, as in other years, comparatively insignificant, it is possible to quote for each month of the quarter average prices, arrived at as above described, for second grade and for prime cattle respectively as under:—

MONTHS.	AVERAGE PRICES.			
	GOOD or Second Quality.		PRIME or First Quality.	
	Per Stone.	Per Cwt.	Per Stone.	Per Cwt.
	s. d.	s. d.	s. d.	s. d.
January - - -	4 0 $\frac{3}{4}$	32 6	4 3 $\frac{3}{4}$	34 6
February - - -	4 0 $\frac{3}{4}$	32 6	4 4	34 8
March - - -	4 1 $\frac{1}{4}$	32 10	4 4 $\frac{1}{4}$	34 10

The tendency of the markets, as indicated by these figures, has been a rising one during the first quarter of the year, and it may be noted that the prices represent the mean results of a number of specific transactions and the prices at which they actually took place. Notwithstanding the comparatively limited number of animals for which these records are available, it may fairly be claimed that averages based upon the recorded sales of nearly 21,000 cattle at 12 several widely

separated markets, under various conditions, can hardly fail to a certain extent to be regarded as typical of the course of trade.

Reverting to the quarterly prices, it will be seen from the following table that, with one or two slight exceptions, they show an improvement in comparison with those for the similar period of 1898.

PLACES.	INFERIOR or Third Quality.		GOOD or Second Quality.		PRIME or First Quality.	
	1899.	1898.	1899.	1898.	1899.	1898.
	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Carlisle - -	26 8	25 4	30 4	29 10	33 0	32 6
Leeds - - -	28 0	28 0	28 10	29 6	32 0	31 10
Liverpool - -	24 4	24 0	29 0	28 0	33 4	32 0
London - - -	26 4	25 4	34 4	32 10	38 0	37 4
Newcastle - -	28 4	26 4	32 4	29 8	34 10	33 6
Shrewsbury - -	29 8	24 8	32 10	29 8	34 8	33 8
Aberdeen - - -	25 0	24 4	32 4	32 2	35 0	34 6
Dundee - - -	27 4	26 10	32 2	32 0	34 4	34 6
Edinburgh - -	—	28 10	33 10	33 0	34 10	33 8
Falkirk - - -	29 4	28 8	32 8	32 2	33 10	33 10
Glasgow - - -	31 4	31 0	32 8	32 0	34 10	34 4
Perth - - -	30 8	30 4	32 2	32 2	34 4	34 4

The actual sale of fat cattle by live weight—as distinguished from the larger number for which weight and price are returned whether the transaction took place at an agreed rate per stone or per cwt. or not—appears to grow in favour. The number returned as sold at an actual rate per live cwt. during the first quarter of 1899 was 3,806; and small as this number is, it is to be remembered that it compares with a total of only 2,090 for the first quarter of 1898. Glasgow and Falkirk still retain their pre-eminence in this respect, and the other places at which sales by live weight were recorded were Dundee, Edinburgh, London, Liverpool, and Newcastle. The prices calculated from these sales by actual live weight range from 4s. 2d. per stone at Liverpool to 4s. 7 $\frac{1}{4}$ d. per stone at London for prime quality, and from 3s. 10 $\frac{3}{4}$ d. per stone at Edinburgh to 4s. 3 $\frac{1}{2}$ d. per stone at London for second quality cattle.

Cattle, Sheep, and Swine, entering the Markets and Marts of the undermentioned Places, with the Number Weighed, as received from the Market Authorities in the **First Quarter** of 1899, under the Markets and Fairs (Weighing of Cattle) Act, 1891 (54 & 55 Vict. c. 70).

PLACES.	Cattle.			Sheep.			Swine.		
	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.
ENGLAND.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Ashford - - -	2,399	40	—	12,587	20	—	5,302	—	—
Birmingham - -	6,768	6	6	10,819	—	—	54,366	—	—
Bristol - - -	13,227	—	—	16,461	—	—	—	—	—
Carlisle - - -	11,488	2,601	2,601	46,274	—	—	3,973	—	—
Leicester - - -	11,039	169	148	10,636	8	8	1,875	—	—
Leeds - - -	8,633	435	435	25,990	271	271	2,571	—	—
Lincoln - - -	1,641	5	5	15,679	—	—	2,760	—	—
Liverpool - - -	17,035	1,550	1,550	43,213	112	112	—	—	—
London - - -	19,995	3,235	1,334	116,550	981	51	—	—	—
Newcastle-upon-Tyne	22,276	823	823	69,245	—	—	11,268	239	239
Norwich - - -	25,772	91	—	38,219	—	—	6,523	—	—
Salford - - -	30,665	457	—	93,775	—	—	936	—	—
Shrewsbury - - -	9,742	1,708	1,525	7,526	—	—	6,653	—	—
Wakefield - - -	17,017	566	77	42,998	—	—	3,260	6	6
York - - -	19,779	—	—	16,148	—	—	1,525	—	—
SCOTLAND.									
Aberdeen - - -	12,605	5,855	5,855	11,601	4,957	4,957	3,312	—	—
Dundee - - -	3,616	2,617	2,588	6,370	2,486	2,486	556	4	4
Edinburgh - - -	15,103	5,929	*3,042	47,003	30	—	1,666	—	—
Falkirk - - -	2,109	1,006	1,006	1,438	—	—	17	—	—
Glasgow - - -	21,641	3,657	3,491	79,268	12	—	1,364	—	—
Perth - - -	10,146	2,317	*534	34,313	822	822	2,317	76	76
TOTAL for ENGLAND	217,476	11,686	8,504	566,120	1,392	442	101,012	245	245
TOTAL for SCOTLAND	65,220	21,381	*16,516	179,993	8,307	8,265	9,232	80	80
Total - - -	282,696	33,067	*25,020	746,113	9,699	8,707	110,244	325	325

* Prices for 2,887 cattle in addition to the above were quoted from Edinburgh and for 1,783 cattle from Perth, but without distinguishing the quality.

PRICES OF MEAT, CORN, AND DAIRY PRODUCE.

AVERAGE PRICES of DEAD MEAT, per Stone of 8 lbs., at the LONDON CENTRAL MEAT MARKET, during the First Quarter of 1899, and during the Months of February, March, April, and May, 1899.

(Compiled from the prices quoted weekly in the Meat Trades Journal.)

DESCRIPTION.	1ST QUARTER 1899.	FEBRUARY, 1899.	MARCH, 1899.	APRIL, 1899.	MAY, 1899.
	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
BEEF:—					
Scotch, short sides - -	4 1 to 4 4	4 0 to 4 3	4 1 to 4 4	4 0 to 4 4	4 1 to 4 4
„ long sides - -	3 10 „ 4 0	3 9 „ 3 11	3 10 „ 4 1	3 10 „ 4 0	3 10 „ 4 1
English - - -	3 9 „ 3 11	3 8 „ 3 11	3 10 „ 4 0	3 9 „ 3 11	3 9 „ 3 11
Cows and Bulls - -	2 1 „ 2 11	2 0 „ 2 11	2 2 „ 3 0	2 2 „ 3 0	1 11 „ 2 9
American, Birkenhead killed	3 6 „ 3 9	3 6 „ 3 9	3 6 „ 3 9	3 5 „ 3 8	3 4 „ 3 7
„ Deptford killed -	3 6 „ 3 9	3 6 „ 3 9	3 7 „ 3 10	3 6 „ 3 9	3 5 „ 3 8
Argentine „ „ -	3 1 „ 3 6	3 2 „ 3 6	3 3 „ 3 6	3 0 „ 3 4	2 8 „ 3 2
American Refrig. hind-qrs	3 8 „ 3 10	3 7 „ 3 10	3 8 „ 3 11	3 8 „ 3 11	3 4 „ 3 7
„ „ fore-qrs	2 6 „ 2 9	2 6 „ 2 8	2 8 „ 2 10	2 8 „ 2 9	2 4 „ 2 7
Australian, Frozen hind-qrs	2 1 „ 2 3	1 11 „ 2 1	2 6 „ 2 8	2 8 „ 2 9	2 4 „ 2 5
„ „ fore-qrs	1 9 „ 1 10	1 8 „ 1 10	1 10 „ 1 11	2 1 „ 2 2	1 11 „ 2 0
New Zealand „ hind-qrs	2 4 „ 2 7	2 3 „ 2 5	2 8 „ 2 11	— 3 0	— 2 8
„ „ fore-qrs	1 11 „ 2 0	1 11 „ 2 0	2 1 „ 2 3	2 2 „ 2 3	— 2 0
MUTTON:—					
Scotch, Prime - - -	4 1 „ 4 6	4 1 „ 4 6	4 2 „ 4 6	4 4 „ 4 9	5 1 „ 5 7
English, Prime - - -	3 10 „ 4 5	3 9 „ 4 4	4 0 „ 4 5	4 3 „ 4 7	4 9 „ 5 2
Ewes - - -	3 1 „ 3 6	3 1 „ 3 5	3 4 „ 3 8	3 4 „ 3 7	3 5 „ 3 10
Continental - - -	3 5 „ 3 10	— —	3 9 „ 4 2	— 4 4	4 11 „ 5 2
River Plate, Town killed -	3 3 „ 3 6	3 5 „ 3 7	3 5 „ 3 8	3 3 „ 3 6	3 5 „ 3 7
New Zealand, Frozen -	2 0 „ 2 8	2 0 „ 2 8	2 0 „ 2 9	2 3 „ 2 10	2 6 „ 2 11
Australian, Frozen -	1 11 „ 2 1	1 11 „ 2 1	2 1 „ 2 2	2 3 „ 2 5	2 5 „ 2 6
River Plate, Frozen -	2 0 „ 2 1	1 11 „ 2 0	2 0 „ 2 2	2 3 „ 2 4	2 5 „ 2 6
LAMB:—					
English - - -	5 6 „ 7 4	— —	5 6 „ 7 4	5 10 „ 7 2	5 7 „ 7 0
New Zealand, Frozen -	3 0 „ 3 4	3 1 „ 3 5	2 11 „ 3 2	2 11 „ 3 4	3 2 „ 3 7
VEAL:—					
English - - -	4 5 „ 4 11	4 5 „ 4 11	4 7 „ 5 0	4 8 „ 5 0	4 2 „ 4 7
Foreign - - -	3 9 „ 4 3	3 9 „ 4 3	3 9 „ 4 5	4 2 „ 4 7	3 6 „ 4 0
PORK:—					
English, best - - -	3 8 „ 4 0	3 8 „ 4 0	3 9 „ 4 1	3 10 „ 4 2	3 7 „ 4 0
„ secondary - - -	3 1 „ 3 6	3 1 „ 3 6	3 2 „ 3 7	3 3 „ 3 8	3 2 „ 3 6
Foreign - - -	3 1 „ 3 6	3 1 „ 3 6	3 2 „ 3 7	3 3 „ 3 8	3 2 „ 3 6

AVERAGE WHOLESALE PRICES OF CATTLE and SHEEP, per Stone of 8 lbs., sinking the offal, at the METROPOLITAN CATTLE MARKET, during the undermentioned Quarters of 1898 and 1899.

PERIOD.	CATTLE.			SHEEP.		
	Inferior.	Second.	First.	Inferior.	Second.	First.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1st Quarter, 1898	2 4	3 9	4 4	3 4	5 1	5 9
2nd Quarter „	2 4	3 7	4 2	2 10	4 5	5 2
3rd Quarter „	2 4	3 8	4 3	3 1	4 8	5 5
4th Quarter „	2 5	3 9	4 5	3 3	4 10	5 7
1st Quarter, 1899	2 6	3 11	4 6	3 5	4 11	5 8

AVERAGE WHOLESALE PRICES OF BEEF and MUTTON, per Stone of 8 lbs., by the Carcase, at LIVERPOOL and GLASGOW, during the under-mentioned Quarters of 1898 and 1899.

PERIOD.	LIVERPOOL.*				GLASGOW.†			
	BEEF.		MUTTON.		BEEF.		MUTTON.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1st Quarter, 1898	2 0 to 3	6	3 4 to 4	8	2 4 to 3	8	3 0 to 4	8
2nd Quarter „	2 4 „ 3	2	3 8 „ 4	10	2 8 „ 3	6	3 4 „ 4	8
3rd Quarter „	2 4 „ 3	6	3 2 „ 4	8	2 4 „ 3	6	3 4 „ 4	6 1
4th Quarter „	2 4 „ 3	8	3 4 „ 4	8	2 8 „ 3	10	3 0 „ 4	6
1st Quarter, 1899	2 6 „ 3	9	4 2 „ 4	10	2 10 „ 3	8	3 8 „ 4	4

* Compiled from information furnished by the Medical Officer of Health, Liverpool. The prices quoted are for Carcases of Animals *slaughtered at the Liverpool Abattoir*, and do not apply to Imported Meat.

† Compiled from information furnished by the Principal of the Veterinary College, Glasgow.

BERLIN MARKET.

AVERAGE PRICES of CATTLE and SHEEP (First Quality Dead Weight) in the BERLIN CATTLE MARKET in the under-mentioned Months of 1899.

MONTHS.	CATTLE.		SHEEP.	
	Per Cwt.		Per Cwt.	
1899.	s. d.	s. d.	s. d.	s. d.
March - - - -	61 4	to 65 11	57 0	to 59 0
April - - - -	61 4	„ 65 8	56 9	„ 58 10
May - - - -	61 9	„ 66 2	57 0	„ 59 5

NOTE.—The above prices have been compiled from the weekly returns published in the *Deutsche Landwirtschaftliche Presse*.

PARIS MARKET.

AVERAGE PRICES of CATTLE, SHEEP, and SWINE (Medium Quality) in the PARIS CATTLE MARKET in the under-mentioned Months of 1899.

MONTHS.	OXEN.	CALVES.	SHEEP.	PIGS.
	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.
LIVE WEIGHT.				
1899.	s. d.	s. d.	s. d.	s. d.
March - - -	30 6	43 7	35 2	42 4
April - - -	31 9	46 8	34 10	42 7
May - - -	31 8	47 2	35 6	42 4
DEAD WEIGHT.				
1899.	s. d.	s. d.	s. d.	s. d.
March - - -	51 0	74 6	70 5	61 0
April - - -	53 2	77 11	73 5	60 11
May - - -	52 11	78 10	71 3	61 11

NOTE.—The above prices have been compiled from the weekly returns published in the *Journal d'Agriculture Pratique*.

CHICAGO.

PRICES of CATTLE at CHICAGO per Cwt. (Live Weight) in the under-mentioned Months of 1899.

Months.	Good Dressed Beef and Shipping Steers.		Export Cattle.		Extra Prime Cattle.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1899.						
March - -	21 8	to 25 2	22 5	to 26 10	26 4	to 28 6
April - -	21 11	„ 25 8	21 11	„ 26 7	25 11	„ 28 6
May - -	22 5	„ 25 2	22 2	„ 25 2	25 2	„ 26 7

Compiled from the Live Stock Reports issued by Messrs. Clay, Robinson, and Co., of the Union Stock Yards, Chicago, Illinois.

AVERAGE VALUES, per Cwt., of various Kinds of DEAD MEAT Imported into the United Kingdom from FOREIGN COUNTRIES and BRITISH POSSESSIONS in the under-mentioned Quarters of 1898 and 1899.

(Computed from the Trade and Navigation Accounts.)

PERIOD.	BEEF.		MUTTON.	PORK.		BACON.	HAMS
	Fresh.	Salted.	Fresh.	Fresh.	Salted.		
1st Quarter, 1898 -	s. d. 40 8	s. d. 25 11	s. d. 28 10	s. d. 42 11	s. d. 25 10	s. d. 34 6	s. d. 39 9
2nd Quarter „ -	39 3	26 9	29 8	41 10	22 9	36 5	39 2
3rd Quarter „ -	37 8	26 1	30 0	41 9	20 5	37 1	39 1
4th Quarter „ -	35 3	25 10	29 8	41 1	23 7	36 8	40 2
1st Quarter, 1899 -	39 4	26 1	30 6	40 10	24 5	34 3	38 7

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels,* computed from the Weekly Averages of Corn Returns from the 196 Returning Markets of ENGLAND AND WALES, pursuant to the Corn Returns Act, 1882, together with the QUANTITIES returned as sold at such Markets, in the under-noted periods of the Years 1899, 1898, and 1897.

QUARTER ENDED	PRICES.			QUANTITIES.		
	1899.	1898.	1897.	1899.	1898.	1897.
Wheat.						
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
Lady Day - - -	26 3	35 1	29 7	868,579	699,657	619,679
Midsummer - - -	—	41 5	27 6	—	557,504	619,618
Michaelmas - - -	—	32 8	30 4	—	308,279	635,698
Christmas - - -	—	27 2	33 3	—	1,036,975	881,566
Barley.						
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
Lady Day - - -	27 1	27 9	24 0	830,398	902,452	784,713
Midsummer - - -	—	26 10	21 4	—	47,621	78,488
Michaelmas - - -	—	25 10	21 6	—	99,743	118,875
Christmas - - -	—	28 2	27 0	—	2,603,841	2,275,111
Oats.						
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
Lady Day - - -	16 11	17 5	16 4	251,841	226,150	194,193
Midsummer - - -	—	19 10	17 3	—	93,475	79,707
Michaelmas - - -	—	19 7	17 10	—	78,787	75,824
Christmas - - -	—	16 11	16 5	—	289,652	200,710

* Section 8 of the Corn Returns Act, 1882, provides that where returns of purchases of British Corn are made to the local inspector of Corn Returns in any other measure than the imperial bushel or by weight or by a weighed measure that officer shall convert such returns into the imperial bushel, and in the case of weight or weighed measure the conversion is to be made at the rate of 60 imperial pounds for every bushel of wheat, 50 imperial pounds for every bushel of barley, and 39 imperial pounds for every bushel of oats.

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Returns received under the Corn Returns Act, 1882, in each of the under-mentioned Weeks in 1899, and in the corresponding Weeks in 1898 and 1897.

Weeks ended (<i>in</i> 1899).	Wheat.			Barley.			Oats.		
	1899.	1898.	1897.	1899.	1898.	1897.	1899.	1898.	1897.
Jan. 7 -	s. d. 27 0	s. d. 34 11	s. d. 31 1	s. d. 28 3	s. d. 27 9	s. d. 25 5	s. d. 17 0	s. d. 16 10	s. d. 16 3
„ 14 -	27 2	35 0	31 8	28 2	27 8	24 10	17 1	17 4	16 5
„ 21 -	27 0	34 11	31 7	27 11	27 10	25 5	17 1	17 5	16 6
„ 28 -	26 7	34 6	31 3	27 9	27 8	24 7	17 0	17 2	16 8
Feb. 4 -	26 6	34 10	30 7	27 2	28 0	24 10	17 0	17 6	16 7
„ 11 -	26 8	35 1	29 8	27 2	27 8	24 8	17 0	17 5	16 6
„ 18 -	26 0	35 0	28 11	26 10	27 11	23 9	16 11	17 8	16 5
„ 25 -	25 7	35 5	28 2	26 7	27 6	23 8	16 11	17 10	16 3
Mar. 4 -	25 8	35 10	28 3	26 7	28 0	23 0	17 0	17 11	16 3
„ 11 -	25 10	35 8	27 11	26 7	27 10	22 11	16 11	17 9	16 2
„ 18 -	25 10	35 6	27 11	26 3	28 0	22 8	16 10	17 10	16 2
„ 25 -	25 4	35 4	27 9	26 8	28 6	22 5	17 0	17 8	16 3
Apl. 1 -	24 11	35 3	27 10	26 2	27 11	22 3	16 11	17 10	16 3
„ 8 -	24 7	35 2	27 8	25 1	27 0	22 7	16 11	17 11	16 6
„ 15 -	24 6	35 3	27 0	25 7	28 0	23 0	16 10	18 2	16 3
„ 22 -	24 8	36 1	26 6	25 2	28 3	20 7	17 1	18 4	16 7
„ 29 -	25 0	38 4	27 9	25 10	27 10	20 5	17 5	18 11	17 3
May 6 -	25 3	42 4	28 4	24 5	27 8	21 5	17 6	20 4	16 11
„ 13 -	25 4	45 11	27 11	23 11	27 1	20 2	17 9	21 1	17 7
„ 20 -	25 3	48 1	28 1	23 11	26 0	19 10	17 10	21 3	17 9
„ 27 -	25 2	47 9	28 2	23 8	26 5	21 3	17 8	21 5	17 10
June 3 -	25 4	46 3	27 10	24 4	26 10	20 8	18 1	21 0	17 9
„ 10 -	25 6	45 4	27 4	21 10	25 8	22 8	18 2	20 11	17 11
„ 17 -	25 7	42 4	27 0	23 1	26 1	23 9	17 10	20 5	18 0
„ 24 -		40 8	27 0		24 3	19 9		20 7	18 6
July 1 -		38 3	27 1		23 4	18 10		20 8	18 7
„ 8 -		36 10	27 4		25 0	17 4		20 5	18 8
„ 15 -		37 1	27 7		24 1	17 6		20 10	18 3
„ 22 -		38 1	28 1		25 0	18 10		20 10	18 11
„ 29 -		36 11	28 10		24 2	17 10		20 11	19 0
Aug. 5 -		35 7	29 5		26 11	17 9		20 7	18 11
„ 12 -		33 8	29 8		27 5	19 0		20 9	17 4
„ 19 -		32 7	30 4		24 4	19 2		19 11	17 2
„ 26 -		30 7	31 8		27 6	22 5		19 3	17 1
Sept. 2 -		28 1	33 7		27 8	25 11		18 11	17 0
„ 9 -		26 10	33 1		27 9	27 4		17 10	17 3
„ 16 -		25 7	33 10		26 10	28 11		16 10	17 0
„ 23 -		25 5	33 11		26 9	29 7		17 1	16 8
„ 30 -		25 9	33 4		27 0	29 10		16 7	16 4
Oct. 7 -		26 6	32 1		27 5	28 9		16 7	16 0
„ 14 -		26 6	31 10		27 11	28 3		16 6	16 1
„ 21 -		26 8	32 2		28 1	27 5		16 6	16 2
„ 28 -		27 4	32 10		28 8	27 5		16 8	16 0
Nov. 4 -		28 4	33 5		28 6	26 10		17 2	16 5
„ 11 -		28 4	34 0		28 7	26 3		17 5	16 3
„ 18 -		28 1	33 11		28 5	26 2		17 2	16 5
„ 25 -		27 9	33 8		28 4	25 9		17 1	16 8
Dec. 2 -		27 7	33 9		28 6	25 10		17 1	16 9
„ 9 -		27 6	33 9		28 6	26 0		17 3	16 6
„ 16 -		27 2	34 1		28 5	26 4		17 0	17 0
„ 23 -		26 9	34 4		28 6	26 11		17 0	17 0
„ 30 -		26 11	34 6		28 4	27 3		17 0	17 1

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in BELGIUM in the under-mentioned Months of 1899.

Month.	Wheat.	Barley.	Oats.
1899.	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
January - - - -	29 1	23 2	18 0
February - - - -	28 10	23 4	18 10
March - - - -	27 9	23 8	18 8
April - - - -	27 10	23 9	18 9

The above prices have been compiled from the official monthly averages published in the *Moniteur Belge*.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in FRANCE, and ENGLAND and WALES in the under-mentioned Months of 1899.

MONTH.	FRANCE.	ENGLAND.
WHEAT.		
1899.	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>
March - - - -	36 7	25 8
April - - - -	36 4	24 8
May - - - -	36 2	25 3
BARLEY.		
1899.	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>
March - - - -	23 3	26 6
April - - - -	23 6	25 6
May - - - -	23 6	23 11
OATS.		
1899.	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>
March - - - -	18 9	16 11
April - - - -	18 10	17 0
May - - - -	18 11	17 8

Note.—The prices of French grain have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*. The prices of British grain are official averages based on the weekly returns furnished under the Corn Returns Act, 1882.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per
IMPERIAL QUARTER at the under-mentioned Markets in
the under-mentioned Months of 1899.

Month.	London.	Paris.	Breslau.
WHEAT.			
1899.	Per Qr.	Per Qr.	Per Qr.
	s. d.	s. d.	s. d. s. d.
March - - -	26 9	36 3	31 4 to 35 0
April - - -	25 5	36 4	31 2 „ 34 11
May - - -	25 10	36 9	31 3 „ 35 0
BARLEY.			
1899.	Per Qr.	Per Qr.	Per Qr.
	s. d.	s. d.	s. d. s. d.
March - - -	28 9	24 8	23 2 to 26 10
April - - -	28 5	25 9	22 9 „ 26 4
May - - -	21 3	25 9	22 3 „ 25 10
OATS.			
1899.	Per Qr.	Per Qr.	Per Qr.
	s. d.	s. d.	s. d. s. d.
March - - -	17 7	19 4	17 5 to 18 5
April - - -	18 1	19 10	17 2 „ 18 2
May - - -	18 3	20 5	17 9 „ 18 9

Note.—The London quotation represents the price of British corn as returned under the Corn Returns Act, 1882; the price of grain in Paris is the official average price of French grain in that city; the quotations shown for Breslau represent the prices of grain of good merchantable quality.

PRICES OF WOOL.

PRICES OF ENGLISH WOOL, per pack of 240 lbs., in the
under-mentioned Months of 1899.

(Compiled from the Economist.)

DESCRIPTION.	March, 1899.	April, 1899.	May, 1899.
	£ s. £ s.	£ s. £ s.	£ s. £ s.
South Down - -	7 10 to 10 0	7 10 to 10 0	7 10 to 10 0
Half-breds - -	7 0 „ 8 0	7 0 „ 8 0	7 0 „ 8 0
Leicester - -	7 0 „ 8 0	7 0 „ 8 0	7 0 „ 8 0
Kent Fleeces - -	6 10 „ 7 10	6 10 „ 7 10	6 10 „ 7 10

MEAN WHOLESALE PRICES of BUTTER, MARGARINE, and
CHEESE in the under-mentioned Months of 1899.

(Compiled from the Grocer.)

DESCRIPTION.	March, 1899.			April, 1899.			May, 1899.		
	Per Cwt.			Per Cwt.			Per Cwt.		
	s.	d.	s. d.	s.	d.	s. d.	s.	d.	s. d.
BUTTER :									
Cork, 1sts - -	110	6	—	101	0	—	81	0	—
„ 2nds - -	101	0	—	91	0	—	77	6	—
„ 3rds - -	91	6	—	86	0	—	75	0	—
„ 4ths - -	78	0	—	77	6	—	72	0	—
Friesland - -	95	0 to	98 6	91	0 to	94 0	81	0 to	85 0
Dutch Factories - -	96	6 „	101 0	94	6 „	97 0	83	6 „	87 6
French Baskets - -	97	0 „	108 6	94	6 „	106 6	85	6 „	95 0
Crocks and Firkins - -	90	6 „	95 0	87	6 „	91 6	80	0 „	84 0
„ 2nds and 3rds	84	6 „	87 0	82	6 „	84 6	73	6 „	77 6
Danish and Swedish -	110	0 „	113 0	103	0 „	106 0	93	0 „	95 0
Finnish - -	84	0 „	104 0	82	0 „	98 6	79	0 „	90 0
Russian - -	80	0 „	96 0	79	0 „	95 0	77	0 „	88 6
Canadian and States -	70	0 „	94 0	67	0 „	93 0	64	0 „	88 6
Argentine - -	94	6	104 6	93	0 „	102 0	92	0 „	102 0
Colonial, fine- -	90	0	100 0	89	0 „	99 6	84	6 „	92 0
„ good and inferior - -	70	0 „	87 6	69	0 „	85 0	66	0 „	80 0
Fresh Rolls (Foreign) per doz. - -	10	6 „	15 0	10	6 „	14 0	9	3 „	12 6
MARGARINE :									
Margarine - -	30	0 „	60 0	30	0 „	59 0	30	0 „	55 6
Mixtures - -	58	0 „	82 0	57	6 „	81 0	56	0 „	75 6
CHEESE :									
Cheddar - -	44	6 „	72 0	49	0 „	73 0	56	0 „	74 0
Somerset - -	50	0 „	64 0	51	0 „	64 0	55	0 „	65 6
Cheshire - -	75	6 „	80 0	75	0 „	80 0	76	0 „	80 0
Wiltshire - -	60	0 „	66 0	61	0 „	65 6	60	6 „	66 0
Double Gloucester -	47	0 „	55 6	50	0 „	60 0	49	0 „	61 0
Derby - -	51	0 „	65 0	54	0 „	64 0	50	0 „	57 6

WEEKLY PRICES (WHOLESALE) of VEGETABLES and FRUIT
at COVENT GARDEN MARKET.(Compiled from the *Gardeners' Chronicle*.)

	Week ending							
	4th May.		11th May.		18th May.		25th May.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
VEGETABLES—								
Artichokes, Globe, per dozen	3 0 to 4 0		2 0 to 2 6		2 0 to —		3 6 to —	
Asparagus, English, per bundle	2 0,, 5 0		2 0,, 4 6		1 0,, 3 6		1 0,, 3 6	
Beans, Dwarf, Channel Islanas, per lb.	0 9,, 0 10		0 6,, 0 8		0 6,, 0 8		0 9,, 0 10	
Beans, English, per lb.	0 9,, 0 10		0 6,, 0 8		0 6,, 0 8		1 0,, —	
Beetroots, per dozen	0 6,, 0 9		0 6,, 0 9		0 6,, 0 9		0 6,, 0 9	
Beetroots, per bushel	2 0,, 2 6		2 0,, 2 6		2 0,, 2 6		2 0,, —	
Broccoli, per dozen	—		1 0,, 2 6		1 0,, 2 6		1 0,, 2 6	
Cabbage, per tally	4 0,, 5 0		4 0,, 5 0		3 6,, 5 0		3 6,, 4 0	
Carrots, New French, per bunch	0 6,, 0 8		0 6,, —		0 6,, 0 8		0 6,, 0 8	
Carrots, washed, in bags	5 0,, —		4 0,, —		4 0,, —		5 6,, —	
Carrots, Surrey, per doz. bunches	2 6,, —		2 6,, —		2 6,, —		3 0,, —	
Celery, Red, per dozen bundles	6 0,, —		6 0,, —		9 0,, 12 0		—	
Cress, per dozen punnets	1 6,, —		1 6,, —		1 6,, —		1 6,, —	
Cucumbers, per dozen	2 0,, 3 0		2 0,, 3 0		2 6,, 3 6		2 0,, 3 0	
Endive, French, per dozen	1 6,, 2 0		1 6,, 2 0		1 6,, —		1 6,, 1 9	
Horseradish, English, per bundle	2 0,, 2 6		2 0,, 2 6		2 0,, 2 6		2 0,, 2 6	
Lettuce, Cos, per dozen	4 0,, —		3 6,, 4 0		3 6,, 4 6		3 6,, 4 6	
Mushrooms, House, per lb.	0 6,, 0 8		0 8,, 0 9		0 8,, 0 9		0 6,, 0 9	
Onions, new, bunches	2 0,, 2 6		2 0,, 2 6		2 4,, 3 0		2 6,, 3 0	
Parsley, per dozen	2 0,, —		2 0,, —		2 0,, —		2 0,, 2 6	
Peas, frame, telephone, per lb.	0 10,, —		0 8,, 0 10		0 8,, 0 9		0 10,, 1 0	
Potatoes, Bruce, Saxon, Snow- drops, etc., per ton	80 0,, 110 0		80 0,, 105 0		80 0,, 110 0		80 0,, 110 0	
Potatoes, Dunbar Main Crop, per ton	110 0,, —		105 0,, 110 0		100 0,, 110 0		100 0,, 110 0	
Potatoes, Jersey kidneys, per cwt.	—		30 0,, 32 0		28 0,, —		20 0,, 22 0	
Radishes, Round, per dozen bunches	0 4,, 0 8		1 0,, 1 6		0 10,, —		0 4,, 0 8	
Rhubarb, natural, per dozen bundles	2 6,, 3 0		2 0,, 2 6		2 0,, 2 6		1 6,, 2 6	
Salad, Small, per dozen punnets	1 3,, —		1 3,, —		1 3,, —		1 3,, —	
Spinach, English, per bushel	2 6,, 3 0		2 0,, 2 6		2 0,, 2 6		1 0,, 1 6	
Tomatoes, English, per lb.	0 10,, —		0 9,, 0 10		0 6½,, 0 8		0 6,, 0 8	
Tomatoes, Channel Islands, per lb.	0 8,, 0 10		0 7,, 0 8		0 4,, 0 6		0 4,, 0 6	
Turnips, new French, per bunch	0 8,, 0 9		0 6,, 0 9		0 4,, 0 8		0 4,, 0 8	
Watercress, per dozen bunches	0 6,, —		0 6,, —		0 6,, —		0 4,, 0 6	
FRUIT—								
Apples, Tasmanian and Vic- torian, various, per case	11 0,, 16 0		12 0,, 15 6		10 0,, 15 0		9 0,, 15 0	
Apricots, per box of 24	—		1 0,, 1 3		1 0,, 1 3		1 6,, 2 3	
Cherries, per sieve	—		10 6,, —		9 6,, —		8 0,, 10 0	
Cherries, per box	—		1 6,, —		1 0,, 1 3		1 0,, 1 6	
Gooseberries, per peck	—		—		5 0,, 6 0		5 0,, —	
Grapes, English Hambros, per lb.	3 0,, 4 0		2 6,, 3 0		2 0,, 4 0		1 6,, 2 6	
Melons, each	1 6,, 2 0		1 3,, 1 9		1 6,, 2 0		1 3,, 2 6	
Peaches, per dozen	9 0,, 30 0		9 0,, 30 0		6 0,, 24 0		6 0,, 30 0	
Pears, Australian, per case	5 0,, 6 0		2 0,, 6 0		4 0,, 8 0		4 0,, 8 0	
Pines, St. Michael's, each	2 0,, 5 0		3 0,, 6 0		3 0,, 5 0		3 6,, 6 0	
Strawberries, per lb.	3 0,, 4 0		2 6,, 3 0		3 6,, 4 0		2 6,, 4 0	
Strawberries, seconds, per lb.	2 0,, —		1 0,, 1 6		1 6,, 2 0		1 0,, 1 6	

DISEASES OF ANIMALS IN GREAT BRITAIN.
 NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Board of Agriculture, in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Pleuro-Pneumonia.			Swine-Fever.	
	OUTBREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUTBREAKS Confirmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	No.	No.	No.	No.
December, 1897 -	1	3	23	278	5,731
March, 1898 -	1	1	220	578	11,466
June, 1898 -	—	—	—	879	15,352
September, 1898 -	—	—	—	550	8,017
December, 1898 -	—	—	—	507	8,921
March, 1899 -	—	—	—	594	8,077

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax** and **Glanders** in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).	
	OUTBREAKS Reported.	ANIMALS Attacked.	OUTBREAKS Reported.	ANIMALS Attacked.
	No.	No.	No.	No.
December, 1897 -	102	204	225	458
March, 1898 -	156	245	197	381
June, 1898 -	169	254	195	337
September, 1898 -	92	134	188	361
December, 1898 -	139	223	168	306
March, 1899 -	135	247	176	328

NUMBER OF CASES of **Rabies** in DOGS in GREAT BRITAIN during each of the under-mentioned periods.

THREE MONTHS ENDED	Number of Cases.
31st December, 1897 -	21
31st March, 1898 -	8
30th June, 1898 -	6
30th September, 1898 -	1
31st December, 1898 -	2
31st March, 1899 -	1

DISEASES OF ANIMALS IN IRELAND.

NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Lord Lieutenant and Privy Council in IRELAND, in each of the under-mentioned periods.

QUARTER ENDED	Pleuro-Pneumonia.			Swine-Fever.	
	OUT- BREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUT- BREAKS Con- firmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	No.	No.	No.	No.
December, 1897 -	—	—	—	38	655
March, 1898 -	—	—	—	81	1,039
June, 1898 -	—	—	—	97	1,225
September, 1898 -	—	—	—	105	1,269
December, 1898 -	—	—	—	42	496
March, 1899 -	—	—	—	80	1,356

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax**, **Glanders**, and **Rabies** in Ireland in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).		Rabies.	
	OUT- BREAKS REPORTED.	ANIMALS ATTACKED.	OUT- BREAKS REPORTED.	ANIMALS ATTACKED.	CASES REPORTED.	
					DOGS.	OTHER ANIMALS.
	No.	No.	No.	No.	No.	No.
Dec., 1897 -	—	—	—	—	26	16
March, 1898 -	1	8	—	—	13	2
June, 1898 -	—	—	1	1	28	11
Sept., 1898 -	1	3	2	4	31	12
Dec., 1898 -	—	—	3	3	30	5
March, 1899 -	1	1	—	—	20	5

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SALES.—A depositor who buys Stock in this way can sell the whole or part of it at any time through the Post Office Savings Bank.

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LIST OF LEAFLETS ISSUED BY THE BOARD OF AGRICULTURE.

Number.	Title.
Leaflet No. 1	Mites on Currant and Nut Trees.
" " 2	Vine and Raspberry Weevils.
" " 3	The Turnip Fly or Flea.
" " 4	Caterpillars on Fruit Trees.
" " 5	The Mangel Wurzel Fly.
" " 6	The Field Vole.
" " 8	Farmers and Assessments to Local Rates.
" " 9	Ensilage.
" " 10	Wireworms.
" " 11	The Daddy Longlegs.
" " 12	The Gooseberry Saw-Fly.
" " 13	Acorn Poisoning.
" " 14	The Raspberry Moth.
" " 15	The Apple Blossom Weevil.
" " 16	The Apple Sucker.
" " 18	Fertilisers and Feeding Stuffs Act.
" " 19	Pea and Bean Weevil.
" " 20	The Magpie Moth.
" " 21	The Warble Fly.
" " 22	The Diamond Back Moth.
" " 23	Potato Disease.
" " 24	The Ribbon Footed Corn-Fly.
" " 25	The Cockchafer.
" " 26	Farmers and the Income Tax.
" " 27	Remission of Tithe Rentcharge.
" " 28	Anthrax.
" " 29	Swine Fever.
" " 30	The Codlin Moth.
" " 31	The Onion Fly.
" " 32	Foul Brood or Bee Pest.
" " 33	Surface Caterpillars.
" " 34	The Woolly Aphis or American Blight.
" " 35	The Celery Fly.
" " 36	Cultivation of Osiers.
" " 37	Rabies.
" " 38	The Carrot Fly.
" " 39	Assessments to Land Tax.
" " 40	The Kestrel or Windhover.
" " 41	The Red Spider or Spinning Mite.
" " 42	The Short-eared Owl.
" " 43	Titmice.
" " 44	The Common Lapwing, Plover or Peewit.
" " 45	The Starling.
" " 46	The Stem Eelworm.
" " 47	The Asparagus Beetle.
" " 48	The Pea Thrips.
" " 49	The Fruit Tree Beetle.
" " 50	Water Wagtails or " Dishwashers."
" " 51	The White or Barn Owl.
" " 52	Gooseberry Blight.
" " 53	The Pear Midge.
" " 54	The Spotted Flycatcher.
" " 55	The Swallow.

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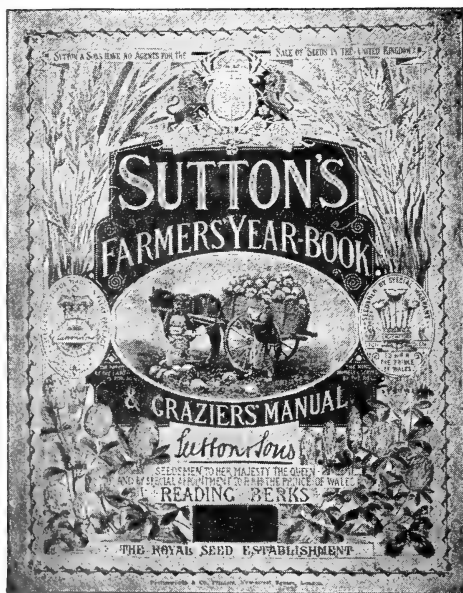
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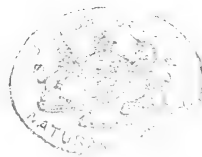
OF THE

BOARD OF AGRICULTURE

SEPTEMBER, 1899.

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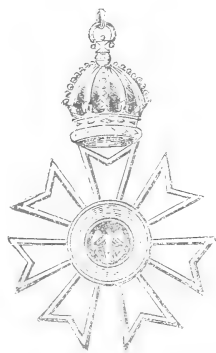
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THE JOURNAL OF THE BOARD OF AGRICULTURE.

Vol. VI. No. 2. SEPTEMBER, 1899.

THE ASH (*Fraxinus excelsior*), AND ITS CULTIVATION.

Among the trades using Ash timber, and more particularly among carriage manufacturers and makers of agricultural implements, considerable inconvenience is being felt from the want of adequate supplies of mature timber of English growth. There is now said to be such a scarcity of marketable Ash throughout Britain that manufacturers have been forced to make enquiries abroad for this class of wood, though none of it comes up to the standard of the home-grown product with regard to the toughness, density of grain, and elasticity which constitute its special technical value.

With such slow-growing crops as timber, it will of course take fully two generations before Ash, now planted, will attain its full technical and financial maturity. But, as prices now rule at from £7 to £11 per load of 40 cubic feet of rough planks as turned out by the sawyer, as the demand is constant and practically certain to remain so, and as the prospect in future is far more likely to be in the direction of gradual enhancement of price rather than towards diminution, the present occasion seems a favourable opportunity for bringing under the notice of landowners a *résumé* of the

sylvicultural characteristics and requirements of the Ash, when grown on strictly economic principles and not chiefly for ornamental purposes. Northampton and Leicester are more particularly suitable for Ash-growing, as their produce ranks first in quality and has long obtained the highest market rate.

From its spontaneous distribution throughout Scandinavia and thence southwards to the shores of the Mediterranean, the Ash proves itself to be a tree capable of enduring both the extreme cold of a northern winter and the great summer heat of southern Europe. But, at the same time, it is decidedly sensitive to late frosts in spring throughout low-lying, moist localities, and here even requires nurses to protect it while young. The shoot within the terminal bud is apt to get nipped with frost, while the shoots in the two side-buds opening later are spared. The result of this is that the Ash has a much stronger tendency to forked growth than is characteristic of any other of our forest trees. When planted on fresh, breezy uplands, however, its lateness in bursting into leaf usually affords a fair protection against spring frosts. When once clear of the danger from frost it soon shoots up in growth. The energy of growth in height continues lively up to about the 40th or 50th year, and in the following twenty years it develops considerable increment in girth. It often reaches maturity between the age of 60 to 80 years; and after this is attained, it is no longer economical to allow trees to stand. When grown in the close canopy of mixed timber crops, and not in any more isolated position, its financial maturity is not infrequently delayed until between the age of 80 to 100 years.

The leading sylvicultural characteristics of the Ash are its inherent demand for light and air, often coupled with inability to endure shade, and its heavy requirements in respect of mineral strength and of moisture in the soil. On the whole, it must be considered one of the most exacting of our forest trees. To attain its best development it should, if possible, be planted on a fresh, deep, light, loamy soil. On dry, light sand, or stiff, heavy clay it not only develops indifferently, but also soon begins to show signs of pre-

mature exhaustion of vital energy through the soil being unable to supply its normal requirements as to mineral food and moisture. Its root-system is both deep and broad, though Ash will thrive well on soils, otherwise suitable, which are hardly deep enough to permit the Oak to attain its finest development. Fortunately for its cultivation, the Ash can often, during the earlier stages of growth, thrive under standards having light canopy and thus protecting it from frost; but later on, and especially as it approaches maturity, it becomes intolerant even of shade from the side tending to interfere with the impulse it then manifests strongly towards lateral extension of its crown of foliage. Owing to its strong demand for light, and its inability to protect the soil adequately against deterioration through the action of sun and wind, Ash is unsuited for the formation of pure forests or even for forming large groups or clumps produced either artificially or from suckers and stool-shoots, except perhaps where Ash-beds are exceptionally profitable through local demand for hop-poles and the like. Even on moist, low-lying situations specially favourable for its growth, it thrives best when grown singly as isolated trees or else merely in small knots and patches.

No situation is better fitted for growing Ash for profit than the sides of moist dells and chines having a good, strong, loamy or clayey soil, through which the moisture from above gradually percolates. This is much better than stagnating subsoil moisture, which is even detrimental unless a full, hot, southern exposure stimulate to evaporation and strong transpiration through the leaves; and even in dells and hollows on the hill-sides the best and largest trees will usually be found in the lowest and most sheltered positions, where the soil is richest.

Hitherto, in Britain, the Ash has chiefly been grown as a hedge-row tree. Here it secures complete exposure to light and air, while its toughness ensures it against being thrown or broken by wind. But in such positions it is apt, when advancing in age, to throw out long superficial roots, which spread into the fields, rob the soil of moisture and of nutrients otherwise available for the agricultural crops, and interfere

with the action of the plough. Moreover, in such completely isolated situations there is an excessive tendency to ramification and coronal development. This not only diminishes the total quantity of useful timber produced, but also very materially affects the elasticity upon which the technical value of the bole mainly depends.

If grown upon purely economical principles, the proper position of the Ash is that of a subordinate tree in woods consisting of a matrix of other trees of somewhat slower growth and better able to protect the soil against deterioration. On hill-sides it may well be planted near small water-courses; whilst on good, but rather moist, low ground it can be grown remuneratively along with Oak, Elm, Sycamore, and Maple, or even with Willows and Alder on land of a wet description. When associated with the Oak on fresh soil, where they often greatly improve the growth of the woods, Ash, Sycamore, etc., should be cut out about the 60th to 70th year, in order that underplanting may take place, unless a sufficiency of stools, stool-shoots, and other underwood obviates the usual necessity for this.

As a standard tree in copse, the Ash finds conditions well suited to its essential requirements. Here it develops a much better bole than in the open, and, with a free crown above the underwood, it soon thickens in girth, without interfering too much with the coppice by overshadowing. Even among the coppice it can throw out vigorous shoots, soon running up into good-sized poles; but the stools are apt to become soon exhausted, when they should be replenished freely. When grown on marshy land among Alder coppice, it also forms a good standard, soon developing a valuable bole.

It is, perhaps, when thus grown as a standard over coppice that Ash attains its best development and its highest market value. Hence the remunerativeness of woodlands might be appreciably increased if stout, healthy, well-grown, young Ash plants were sprinkled judiciously through copse woods wherever the soil seems suitable for the growth of this very valuable tree.

J. NISBET.

THE MARKETING OF EGGS.

During one of the discussions in the course of the Poultry Conference held at Reading in July, a gentleman who is engaged in the trade, speaking on the marketing question, said: "You are talking about your little baskets full of eggs, while we are dealing with them not in little baskets full, but by millions and millions." Such a statement at once indicates the extent of the trade, and the difference in methods adopted at home and abroad. The same speaker further said: "If you go to the London dealers you will see stacks of eggs labelled Austrian and Danish eggs. You will see a few—not many—Irish eggs; and if you ask them where are the English eggs, they will shake their heads and say, 'We have not seen one for years.'" The fact must be recognised that English eggs do not pass through the hands of ordinary wholesale traders, except to a limited extent, and that such as are sold by retailers come direct to them 'with few intermediaries. Hence the wholesale trade knows comparatively little of home produce. They prefer to handle foreign eggs, which can be bought in large quantities, and arrive properly and evenly packed. To induce them to treat English eggs in the same manner, it would be necessary to revolutionise our entire system of marketing, which, however desirable in certain directions, is not so in this case. If the wholesale trade were concerned in the marketing of home eggs to the same extent as now with foreign supplies, we should lose much of the advantage we possess in nearness to markets, for the wholesale man has yet to learn that a few days make a considerable difference in the quality of eggs, and he does not take that trouble to ensure rapidity of sale, which places English in a position unapproachable by any foreign supplies. Unfortunately, however, the position is to a large extent sacrificed

at the present time by non-realisation of the importance of rapid marketing. The necessity for this is beginning to be understood by retailers as well as producers, but these two classes must be brought into closer contact, leaving wholesale men to deal with foreign supplies until they find home produce sufficiently abundant to lead them to alter their methods. All poultry keepers should strive to supply what the Americans call "fancy eggs," the term "fancy" not meaning from high-class stock, but strictly fresh; and in order that producers may obtain fair returns for their goods, these must be sold either direct to consumers, or to such retailers as have the best trade and are willing to meet it in this manner. It may be regarded as a fact that no foreign egg can be put upon the English market at the same age as can our own. Yet many foreign eggs are sold actually fresher than those produced in the immediate neighbourhood. When the latter are marketed as soon as possible after they are laid, and the consuming public is able to rely upon them, the former will be relegated to their proper and inferior position. We cannot hope to do without foreign supplies, for they meet a need at prices which would be unprofitable here, but we may develop and maintain a trade in high-grade qualities in which competition will be practically unknown.

When the number of eggs produced on a farm is sufficiently great, and ordinary business methods are understood, the finding of an outlet for the same at remunerative prices is no more difficult than in the case of other produce, for then regularity of supply can be guaranteed within certain limits. A farmer keeping a large flock of hens which he maintains and manages properly should be able to secure a good market, for he can forward the eggs in sufficient quantities to make the trade worth the attention of retailers and large consumers. Of course, there will be a falling-off in winter, but this is expected. That falling-off can, however, be minimised, and by the adoption of proper methods winter supplies may be ensured. These methods are now becoming better understood, and it may be hoped that a great development will take place in that direction. Further, a large producer is able to save considerably in

carriage, by sending large quantities, and thus securing, as a rule, higher returns. Already many farmers who are producing eggs on the more extensive scale have solved the problem for themselves. Little is heard about them because they have no complaint to make. They provide for a demand which is rapidly increasing. But it is not so with those whose operations are on a smaller scale. They cannot make contracts, because the quantities they are able to offer are alone not worth the attention of the retailer or large consumer, and they cannot promise the regularity of supply desired. Unless they are so situated that a market can be obtained at their own doors, or in the immediate neighbourhood, as in residential districts or near the great centres of population, they are dependent upon local buyers, who, in many cases, have not yet realised the necessity for rapidity of sale, and whose system is calculated to retard rather than to expedite the rate at which the eggs pass from the nest to the egg-cup. Very little dependence can be placed upon eggs sold in this way. Producers and higglers have equally to learn that an egg a week old is not of the same value as when a day old. Producers find no encouragement to supply eggs in the best condition, as they receive no more for those which are a day old than for others which have been laid a week or a fortnight. Higglers and country shop-keepers buy as the eggs are offered. They do not regard quality or freshness, probably holding until they have enough to fill a case, and consequently receive small returns. They do not think of grading for size or testing for quality. A town retailer places small dependence upon such eggs. He may call them "new-laid," or "fresh English," or "country eggs," but he understands that often French, or Danish, and of late the better grades of Irish, are better in every way, and that he can send the last-named out with less risk of complaint than the "natives." Here may be found an explanation why many of those who have endeavoured to awaken interest in English produce have found the retail trade unsympathetic. In a southern county at the end of August one producer was obtaining 1s. 6d. per dozen for eggs wholesale, with equally high prices at other periods of the year, because he

undertook to deliver all eggs the morning after they were laid, so that the retailer always found them reliable. And yet not twenty miles away eggs were being sold at very little more than half the price.

The directions in which special attention should be paid in the marketing of eggs are :—

Gathering.—Eggs should be gathered from the nests once, and if possible twice, a day—morning and afternoon. In warm weather, and when any of the hens are inclined to broodiness, loss by evaporation soon commences. An egg upon which a hen has been sitting for six hours will be partially incubated, and the development of the germ vesicle will have commenced. To avoid this the eggs should be taken away as soon as possible after being laid, and it is better to remove hens from the laying house as soon as they show signs of broodiness. In winter there is less danger of evaporation, but if the temperature is very low there is a risk of the eggshells cracking if left in the nest.

Keeping.—When removed from the nest, eggs should be at once placed in a cool atmosphere, free from taint or smell, and where they will not be exposed to either heat or frost. If they are stained or dirty the marks should be wiped off with a clean sponge or flannel, using cold water. It is much better, however, if this can be avoided, and hence the nests should be kept supplied with fresh, clean straw. A washed egg never looks so well as one unwashed; but a dirty egg becomes tainted sooner than one perfectly clean. Care must be taken to keep the eggs apart from any strong-smelling or tainted material, and if the place is cool and perfectly sweet it is better for the air to circulate around the eggs whilst they are being chilled.

Marketing.—Where eggs are sold direct to consumers they should be delivered at as short intervals as possible. The best plan is to do this daily when practicable, but certainly the intervals should not exceed three days in summer or five days in winter. If to be sent by rail under the small parcels' rates, the usual course is to forward weekly, in which case the freshest eggs should be chosen. Under these circumstances much will depend upon the method of keeping before

dispatch. Eggs gathered soon after being laid and kept in a cool place will be fresher at the end of six days than others at three days which are allowed to remain a day in the nest and are afterwards stored in a warm or variable atmosphere. If sold to local collectors or shop-keepers the same recommendations as to keeping the eggs apply. But under present conditions, and for reasons already given, the best results cannot be looked for if producers are content to sell in this manner unless arrangements are made for frequent delivery. Until more suitable methods are followed by retailers, or some form of combination is adopted by producers themselves, the poultry-keeper whose operations are on a small scale, and who must sell through the trade, is at a serious disadvantage. In Germany, Denmark, and Ireland, co-operation among producers has achieved remarkable results. When more frequent marketing of the eggs becomes the custom a better state of things will prevail. Efforts should be put forth in all rural districts, both by producers and traders, to ensure the marketing of eggs whilst they can correctly be described as new-laid. In this way English produce will gain a position it does not now occupy. Much remains to be done in equalising the supply of eggs throughout the country, by bringing into direct intercourse the producing and consuming districts, with as few intermediary profits as possible. By these means the returns obtainable by those living in the agricultural counties would be increased, and those who are in the great centres of population will not be compelled to depend upon foreign supplies. It is frequently the fact that when eggs are selling in one county at 20 and 22 for a shilling, foreign eggs are being retailed elsewhere at 15d. per dozen. The margin is too great, and gives good promise to those who organise the trade on modern lines.

Testing.—The object of testing is to determine freshness, and to prevent stale eggs from being sold as new-laid. The latter should be disposed of as “cookers.” Where there is uncertainty, then to cover the risk “cooker” price is that which rules. The farmer or cottager who takes up poultry-keeping on proper lines, who gathers the eggs regularly, and

who sells them at once, has no need to test, for these can be guaranteed with confidence. But so many cases have been met with in which, especially during the autumn and winter months, producers themselves hold the eggs, or even buy foreign to mix with their own, that many retailers with a first-class trade are compelled to "candle" every egg before it is sold. A reliable farmer who determines to win the confidence of his customers can do so in a very short period if he takes care never to send out a doubtful egg, for retailers do not want the trouble and expense of testing. Where, however, the produce has to pass through the hands of collectors, they should perform the work; they would soon be rewarded by enhanced prices for fresh eggs, and could pay more to such poultry-keepers as supply them with the best and freshest. The system is simple and inexpensive. A woman or a girl can handle several thousand eggs per diem. A dark room, with walls painted or coloured dark, is most suitable for the work. A candle may be employed, but a lamp, costing half-a-crown, is now sold, which concentrates light through a powerful lens, and greatly facilitates the operation. The object is to discern the size of the air space in the egg. When perfectly fresh this is very small, and can just be seen at the broad end. Every day it increases in size, and when plainly apparent the egg should be ranked as a "cooker," and sold as such. There are other ways by which the freshness of an egg can be determined by the expert, such as general appearance of the shell, etc.; but the most certain test is by candling as already described, for with care a mistake is scarcely possible. Cloudy eggs, or those in which the contents rattle in the shell, are not suitable for use in the household, but should be sold to confectioners or for manufacturing purposes, as are many of the foreign. The collector who adopts the system of testing should make this fact known to buyers, and quote prices for "new-laid" and "cookers."

Grading.—The system of grading eggs is carried out in all foreign countries from which we obtain supplies, but has been brought to the greatest state of perfection in Denmark, whence six sizes are received—namely, 13 to 18 lbs. the long hundred (120). For the past two years the Irish Agricul-

tural Organisation Society has regularly employed a Danish expert to teach the system, and Irish eggs are being forwarded to market properly graded. So long as eggs are not retailed by weight—a method which would be beneficial to all concerned if it were introduced—the retailer is protected by grading, in that he knows that all the eggs in a case will be equal in size, and he can, therefore, pay a fair price for them. Under the present method he must make allowance for a proportion, often a large one, of “smalls.” Hens cannot lay eggs to one pattern, nor will these all be large, and in practice it is found that no more is paid for big than for little eggs. But producers will find that it is to their advantage to have eggs as near the same size as may be possible. A basket in which eggs are of the same size looks better than when they are uneven. Very large eggs should be retained, for they make others look smaller than they really are; and small eggs depreciate the total value to the buyer, who will assuredly imagine there are more of them than is really the case. Grading may be accomplished by using a board perforated with three or four holes of different sizes for eggs weighing $1\frac{7}{8}$ oz., 2 oz., $2\frac{1}{8}$ oz., and $2\frac{1}{4}$ oz. respectively, and passing the eggs through the hole which is nearest in size. In the Danish packing establishments grading is done by eye and hand. So skilful are the operators that they are seldom more than a couple of ounces out in a long hundred. This, however, is only possible where large quantities are handled.

It is noteworthy that an egg with a tinted shell will, on most markets, command a higher price than one with a white shell when equal in size.

Packing.—The long case used for foreign eggs and now coming into vogue for Irish is most suitable where long distances are to be covered and the boxes cannot be returned. But in this country other forms are to be preferred, as they can be returned at a much smaller cost than providing new cases. Moreover, the packing and unpacking is simpler, and it is not absolutely necessary that the box should be filled when the supply falls below the average. They carry the eggs more safely, and in the best cases now sold breakages in transit are practically unknown. Should an egg be broken, the felt or

cardboard used is difficult to clean, and that is their one failing. In whatever way eggs are packed the material must be absolutely sweet, odourless, and perfectly clean. Baskets carry more to the cubic foot than these cases, but they are not so easily packed, and the risk of breakage is greater.

Preserving.—Many systems have been tried for preserving or “pickling” eggs, but up to the present time none has been discovered that retains the pristine quality found in an absolutely new-laid egg. But under proper conditions eggs can be kept for months, and at the end of the time be good as “cookers.” Much depends upon their age and condition when put into the “pickle.” If perfectly fresh they will come out very superior to what will be the case if they are put in several days old. Hence preservation should be carried out by producers who can pickle the eggs within a few hours of being laid. English preserved eggs under this system would rank much higher than any foreign. The best pickle known at present is lime water, the formula for which is, four gallons of freshly slaked lime, and one gallon of salt to twenty gallons of water. But it is equally important to keep the eggs when under preservation in a cold cellar or chamber.

Winter Eggs.—Much complaint is made as to the failure of supply in winter, and poultry keepers should set themselves to provide for regular supplies. That there will be fewer produced in winter is certain, but not to the extent generally supposed. To secure eggs during the cold season it is necessary, first, to hatch the pullets so that they will commence to lay in the latter part of September or in October; second, that young birds—*i.e.*, not more than two years old—be kept; third, that substantial, warm, but well-ventilated houses be provided; and, fourth, that nutritious food be supplied, and assimilation be stimulated by exercise.

Sale of Eggs.—Exposure of eggs in heated shops means deterioration, and retailers should obviate this by use of refrigerators when compelled to keep supplies from day to day. Whether eggs may be marked is a question which must be determined by circumstances. Guaranteed eggs are better marked, but this should be done by the producer.

EDWARD BROWN.

THE GAPE WORM AND THE WHITE INTESTINAL WORMS OF POULTRY.

1. THE GAPE WORM (*Syngamus trachealis*).



The Gape Worm (*Syngamus trachealis*), male and female (magnified, line showing natural size).

Of all parasitic diseases from which poultry suffer, Gapes certainly stands second to none in importance, on account of its widespread occurrence. Every poultry keeper knows of the disease, but very few know much about its economy, and yet a knowledge of its life-history and habits cannot fail to be of advantage.

The prevalence of the worm seems to be increasing, but I fancy this is only an apparent increase, due to the fact that more notice is taken of such matters now than formerly, for our poultry are kept in a more sanitary state than ten years ago. One estimate of the loss caused by Gapes is given in Fleming's *Parasitic Diseases of Domesticated Animals*, the loss being estimated by Crisp (in 1872) for England at half a million pullets per annum. I believe this to be far below the proper estimate. Gapes has been known for a great number of years; one of the earliest records I can find is in 1799, when Dr. Wiesenthal drew attention to the mortality in fowls and turkeys caused by this worm in America in the *Medical and Physical Journal* for May 21st, 1799.

This disease is caused by a Nematode or Round Worm, popularly called the Gape Worm, the Forked or the Red

Worm; scientifically it is named *Syngamus trachealis* by Siebold, *Sclerostoma Syngamus* by Diesing, *Fasciola trachea* by Montague, *Syngamus primitivus* by Molin, and also *Syngamus bifurcatus*.

The internal position taken up by this worm is always in the air tubes, usually the trachea, but sometimes in the bronchi. The disease is really a kind of tracheo-bronchitis, due to the irritating action of the worms on the mucous membrane of the air tubes. Chickens and turkey poults suffer most, but I have seen quite old birds severely affected. In one case I could only account for the death of an old Dorking cock by the number of these red Worms in its trachea; the greatest mortality is, however, in young birds. It is also often very troublesome in pheasantries, carrying off the young by hundreds. *Syngamus trachealis* is also found in the Sparrow, Starling, Rook, Hooded Crow, Linnet, Magpie, Martin, Swift, and Green Woodpecker. So that it is not only by means of unhealthy poultry that the disease is spread, but doubtless naturally by these wild birds; and, as will be seen later, the Earth-Worm acts as a carrier of the disease.

The life history of the Gape Worm has been differently interpreted, but I feel sure that Ehlers and Megnin and some other early observers are correct, namely, that development is direct. A series of experiments I conducted in 1895-96 agree in this respect.

Gapes is a disease which not only occurs in Europe, but also in America and elsewhere. As pointed out years ago by Dr. Wiesenthal, it is chiefly felt on old-established poultry farms. That evil results attend the constant breeding of birds on the same land is well known to gamekeepers, who annually employ fresh land for bringing up the young birds. Yet poultry are frequently reared year after year on the same piece of land. Of course it is not always possible to have fresh breeding ground every season; recourse must then be had to numerous methods of disinfection and remedies which, if properly carried out, will allow of chicks being bred and kept just as free from disease as those kept on a large area. Over-

stocking must be avoided, for it also tends to encourage this vermicaceous bronchitis.

I should say that all breeds of poultry are alike subject to these parasites, although I was not able to give the disease to Indian Game so readily as to some other breeds, such as Dorkings.

Life History of the Gape Worm.

The Gape Worm lives in the trachea and upper part of the bronchi. Male and female are nearly always found permanently in copula. In colour the worm is red, sometimes bright blood red, at others of a brick-dust red. The female varies very much in length, some mature females only being 10 mm. long, others nearly 20 mm. The male may reach as much as 6 mm., but more usually it varies from 2 to 4 mm. The body of the female is cylindrical and the head flattened in front, the mouth being a circular cup-shaped depression surrounded by a circular capsule. At the base of this capsule are six sharp-boring processes around the entrance to the œsophagus. When nearly mature the worm loses its smooth cylindrical form and becomes much swollen in various places by the groups of eggs.

The small red male is firmly united to the vulva of the female, which is towards her head end, by the swollen caudal pouch, which holds the worm on like a sucker.

As many as twenty of these copulating individuals may be found together in one chick, anchored on to the tracheal mucous membrane, and surrounded by a frothy mucus. When these worms are sexually mature they are expectorated by the bird during one of those wheezing coughs so characteristic of the disease. The ova are unable to escape from the female body owing to the male being permanently attached to her vulva; they make their exit, as a rule, through a slit in the body-wall, caused by the skin bursting from cadaveric decay. These eggs are very minute, being only $\frac{1}{250}$ th of an inch in length. They are ellipsoidal in shape, and have a distinct lid or operculum at one end, through which the white embryo worm escapes. The eggs lie about upon the ground, and develop rapidly around water-troughs and in the water. These eggs I have found,

when kept on damp earth and sand, hatch out in from seven to forty days, depending on temperature and moisture.

I experimented in 1895 and 1896 with the eggs, and hatched embryos of this worm, and found that chicks, pullets, and cockerels readily took the disease when fed with a number of either ova or of the small white embryo worms. How they enter the trachea I do not know; whether they enter the crop or stomach first or whether they are detained in the mouth, and thus go straight to the trachea, I could not find out. In from twenty to twenty-four days I found fully-developed worms in the birds. There is thus no necessity for an intermediate host. Ehlers* was the first to show this; he fed birds with *Syngamus* ova, and in ten days found coupled worms in them. Megnin† also has given "gapes" to a parrot by feeding it with the ova from a pheasant.

There is no doubt but that earthworms swallow large numbers of the eggs and embryos with the large quantities of soil they take in, and that many gape germs enter fowls in that way; but the earthworm is no second host, although numbers of the ova and embryos may accidentally be found in them. Earthworms act as carriers, as it were, of the disease.

Several other theories regarding intermediate hosts, such as the connection between lice and gapes, mollusca and other possible intermediaries, need only be mentioned, as there is at present no evidence in favour of the necessity or even accidental occurrence of the Gape Worm in any stage in them. On the other hand, it is known that ova and embryos given to perfectly healthy birds will give them syngamosis.

The eggs may be kept often for a great length of time without developing, and some of the embryos kept in damp ground have given a bird the disease after six months keeping.

Symptoms of Gapes.

The symptoms of gapes are well known, but are not always diagnostic unless taken *in toto*. The yawning or

* Vorläufige Mittheilungen über d. Entwicklung von *S. trachealis*. Sitzber. d. Phys. Med. Soc. Erlanger. p. 43. 1872.

† Mém. sur. l'Epizootie Vermineuse des Faisanderics, Rec. d. Méd. Vét., 1882.

gaping of the mouth and constant straining forward of the neck usually indicate the presence of *Syngami* in the trachea. In young birds there is a sudden wheezing cough, but I have also noticed it in a few birds up to a year old. This gurgling wheezing cough is very similar to that noticed in birds suffering from diphtheritic roup, a disease which I find, unlike gapes, is chiefly prevalent in old birds. In bad cases of gapes the mouth and sometimes the nostrils become filled with a frothy saliva. The affected bird becomes dull and listless, the feathers lose their gloss and become erect, and the comb may sometimes darken. The worms by virtue of their number may block up the trachea and so cause death, or they may so irritate the mucous membrane as to set up violent inflammation which may end similarly.

Post-mortem Appearances of the Air-tubes.

If the trachea is slit up soon after death the worms will very often be found still attached to the mucous membrane so firmly that they may be torn in parts in trying to pull them off. When the worms have been removed and the frothy saliva that surrounds them cleared away, small yellow tumorous patches may be seen where the worms have been attached. The walls of the trachea or bronchi around these areas also become affected.

Treatment and Prevention of Gapes.

Prevention.—It is very important that any bird showing symptoms of gapes should be isolated, so as to stop the disease spreading by means of the coughed-up *Syngami* and their countless eggs.

After an outbreak of gapes it is very necessary, if the birds are kept in confined spaces, to treat the ground with either gas-lime or with a 1 per cent. solution of sulphuric acid, which will destroy the eggs and embryos on the ground.

When possible fresh breeding-grounds should be chosen every year, and the young birds always kept away from the stock birds. Overcrowding should also be avoided, as it is one of the most fruitful sources of all parasitic diseases, the birds never being so healthy if they are crowded together

as when they have a free run ; hence it is that disease is so often found in confined spaces, such as small-holders and cottagers are obliged to use. It is in these instances that special preventive and remedial measures are necessary, not so much where farmers keep their birds on a free grass run ; although, in the latter case, the more often the birds are moved from field to field the better.

All diseased birds that die should be properly destroyed ; the head and necks of those that have succumbed to gapes should be burnt.

Drinking vessels must be kept scrupulously clean, and pure water only given the birds to drink. The vessels are best cleansed by being scalded, which should be done at least once every week, for the eggs of this worm often get into the water from the fowl's mouth whilst drinking, having been released from the worm by the latter's rupturing during its passage out from the trachea, and may become attached to the green slime so often seen around the vessels.

Remedies.—These are numerous. That most generally employed is to open the bird's mouth and push a feather down the windpipe and twist it round, thereby dislodging some of the worms, which get torn by the movements of the feather. If this rather unsatisfactory measure is adopted, a drop of oil of cloves or a drop of iodine on the feather will act more successfully, but some worms may still remain unhurt in the bronchi. The eggs escaped from the ruptured females may also come up in the mucus and contaminate the ground and water.

The use of the fumigating-box is far the best method of treatment. The box should be made large enough to take several birds at once ; then through an opening either Camlin Powder or a preparation of finely divided chalk and camphor should be blown into the box with force by means of bellows, so as to permeate the air in the box. The birds breathe this in, the camphor causes the worms to relax their hold, and the violent coughing which the powder produces helps the birds to expectorate the parasites. To every ounce of powdered chalk add half an ounce of finely ground camphor ; the fresher the powder is the better.

Montague and Maguire have had good results with garlic, either chopped up in the food or given in pills to birds suffering from gapes. The volatile properties act on the worms in the trachea, and it is said cause them to loosen their hold. Onion or garlic given to chicks in the food is certainly advisable; not only is it good for them, but I believe it keeps off the worm.

Tracheal injections with iodine or eucalyptus oil can also be employed with success, but care is required in this method of treatment, and, therefore, it is not to be recommended. The fumigating-box is the best plan for general use.

A 1 p.c. solution of salicylic acid given to the birds to drink instead of pure water in a district where gapes is prevalent is likely to be of some value, as it apparently affects the young of this worm, but, at the same time, it must be remembered that numbers of embryos are obtained from earthworms and off the ground.

II. WHITE THREAD WORMS OF THE FOWL.

(*Heterakis inflexa* and *papillosa*.)

Amongst the numerous parasitic worms of the fowl which live in the alimentary canal, the white thread worms are the most important and are most often met with.

These white worms, of which two species are often found in Great Britain, sometimes appear in epizootic form and may cause serious mortality, the disease being as a rule attributed to other factors.

Damage probably caused by these worms in domestic birds was recorded as far back as 1789 by Baronio,* and certainly by Blavette and Rossignol† in 1840. I have frequently come across these worms, and could attribute death to no other cause than their presence; at the same time I have seen numbers of fowls suffering from these nematodes, and yet not much affected by their sojourn in their alimentary canal.

In post-mortem examinations I have found both species

* *Vide* Fleming, History of Animal Plagues, I., p. 529. 1891.

† Recueil d. Méd. Vét. Pratique, xvii., 1840, p. 339, and xxxv., p. 348. 1858.

usually located in the duodenum. The commonest species at one time seemed to be the *H. inflexa* of Rudolphi, a white worm which is described as being from 7 to 12 cm. long in the female and from 3 to 8 cm. long in the male. I have never, however, seen them this length. During the last four years I have scarcely seen one of this species, but numbers of the small white worm, *H. papillosa*, the largest of which was a female measuring 14 mm. in length; the males varying from 7 to 9 mm. A common habit of both these worms seems to be to knot themselves together in a lump in the intestine. I have found as many as fifteen tightly rolled together into a ball, thus forming a plug in the duodenum, causing obstruction and death.

They apparently develop direct from the eggs, which are probably obtained in polluted water or taken off the ground by the birds. Most cases of this parasitic disease that have come to my notice have been in old hens.

The worms may usually be seen in the droppings. Frequent attacks of diarrhoea set in when numbers of parasites are present. The patient becomes ravenous and loses condition.

Prevention and Treatment.

Needless to say, just as in gapes, every bird attacked should be isolated, so that the droppings may be easily and surely destroyed.

If any signs of these pests appear where only a small number of birds are kept in confined areas, it is advisable to dose all the birds. Before doing so they should be given only a small quantity of soft food for a day before. By far the best nematocide is *Thymol*. It can be administered to fowls in one grain doses made up into pills of dough. One dose is as a rule sufficient, but if the worms are very abundant, a second dose next day is advisable; each pill should be followed by a teaspoonful of sweet oil about two or three hours after it has been given.

Santonin may be administered in a similar way in three grain doses, but is not nearly so certain in action as *Thymol*.

After an outbreak, if in confined spaces, the land should

be well purified and the drinking vessels should receive as much attention as in cases of gapes.

Numerous other worms are found in fowls, of which I have compiled a list* of thirty-nine species; none of these are, however, of more than passing interest, and cause little or no loss in England, although at any time epizootics of them might appear.

F. V. THEOBALD.

* The Parasitic Diseases of Poultry, p. 99. F.V.T. 1896.

TREE ROOT-ROT.

(*Agaricus* [*Armillaria*] *melleus*, Vahl.)

The following article, prepared by Mr. G. Massee, F.L.S., has been published in the *Kew Bulletin* as the first of a series of illustrated articles on the subject of the diseases of plants produced by parasitic fungi.

Agaricus melleus is one of the most generally distributed and destructive of "toadstools," attacking all kinds of fruit trees, many broad-leaved forest trees, also all European and many imported conifers. Hartig records having recognised its mycelium in fossil wood of *Cupressinoxylon*. As a saprophyte it occurs in dense clusters at the base of stumps, and also on posts and worked timber.

The cap or pileus is 2 to 3 inches across when expanded, pale honey-coloured, and ornamented with numerous minute scales; stem 4 to 6 inches long, coloured like the pileus; gills white, with just a suspicion of pink, and, when young, hidden by a membrane stretching from the stem to the edge of the pileus. As the latter expands this membrane breaks away from the edge of the pileus and forms a ring or collar round the stem. The spores are white, and settle on objects under the gills in the form of a dense white powder.

The fruit of the fungus is usually not formed until the tree has been killed, or nearly so, by its mycelium; nevertheless, the disease is indicated by the pale colour of the leaves and the stunted branches, and, in the case of conifers, by the great accumulation of extruded resin round the collar.

The spores of the fungus dispersed by wind and carried by the fur of animals, &c., germinate and first form a delicate,

white cobweb-like mycelium, which soon produces blackish, cord-like, radiating strands of mycelium called *rhizomorphs*. These bodies, which vary in thickness from that of thick thread to moderately thick twine, continue to increase in length, travelling a few inches underground, until they come in contact with the root of a tree, when the cortex is pierced and a firm white sheet of mycelium is formed between the cortex and the wood. This felt gradually passes up the trunk for some distance between the bark and the wood, and also extends into other sound roots. At the same time the rhizomorphs continue to spread over the surface of the roots and the collar, entering the cortex at various points. Delicate strands of mycelium extend from the felt formed under the cortex into the wood, principally along the medullary rays, and thence pass into the vessels, which soon become choked with a dense mass of mycelium.

In conifers the mycelium fills the resin-canals and destroys the cells forming their walls, the resin exuding through the bark in large quantities and collecting round the collar; hence the name "resin-flux" sometimes given to this disease.

At a later stage of the disease the surface of the roots and collar are covered with a white felt of mycelium, which exhibits a pale phosphorescent light in the dark.

After the death of the tree, numerous stout, branching, black rhizomorphs form a network between the wood and the bark.

Finally, after a tree has been attacked and the mycelium of the fungus well developed, numerous rhizomorphs spread underground, where they continue to extend until they come in contact with the roots of some neighbouring tree, which is attacked and killed, forming in turn the starting point from which rhizomorphs again wander in search of other victims.

Preventive Measures.

There are two methods by which a tree may become infected:—(1) spores; (2) underground rhizomorphs. Infection by means of spores may be prevented by destroying all fungi growing in the neighbourhood of valuable trees. The fungi should be collected and burned; kicking over and

trampling under foot simply disperses the spores and does more harm than good.

If a tree is suspected of being diseased, this can soon be ascertained to a certainty by exposing the base of the trunk and a root; the presence or absence of white mycelium under the cortex will decide the question. If other trees grow in the vicinity of a diseased tree, the latter should be isolated by means of a narrow trench about 9 inches deep, made at a distance of 3 or 4 yards from the trunk of the diseased tree, for the purpose of intercepting the progress of underground rhizomorphs. The soil removed in digging should be thrown inside the trench.

An illustration of the fungus is given in the *Kew Bulletin*, Nos. 147 and 148, price 8d., published by Messrs. Eyre and Spottiswoode, East Harding Street, E.C.

THE MANURING OF POTATOES.

Useful observations on the manuring of potatoes are contained in the reports recently issued by several agricultural colleges in Great Britain relating to the results obtained in experiments, conducted on more or less similar lines, to determine the effects on the crop of the application of varying quantities of artificial manures, when used alone and in combination with dung, and to test the respective merits of the different artificial manures employed.

Experiments of this character were carried out, in 1898, in a field at the Manor Farm, Garforth, by the Agricultural Department of the Yorkshire College; at Cockle Park, Northumberland, under the direction of Dr. Somerville; on 19 farms in Scotland under the supervision of Professor Wright of the Glasgow and West of Scotland Technical College; and at ten stations in Lancashire, under the direction of Professor Campbell, on behalf of the Harris Institute, Preston. The detailed schemes of the trials at these four centres were directed, *inter alia*, to the elucidation of the following points, viz.: the influence on the potato crop of supplementing dung with artificial manures; the effects of using artificials alone and in combination with dung; the effects of the omission of nitrogen, phosphoric acid, and potash respectively from a complete manure containing all three; the effects of increasing nitrogen, phosphoric acid and potash respectively in a complete manure; and the relative values of sulphate of ammonia and nitrate of soda.

Some features of practical interest are afforded by the results of the comparative trials made with dressings of dung

and artificials against dung alone. At Garforth the plots which received an application per acre of 4, 8, and 12 cwts. respectively of a complete artificial manure, along with 12 loads (about 9 tons) of dung, furnished, in each instance, a larger crop of potatoes than the plot which received farmyard manure alone; but a fair money return was obtained only from the use of 4 cwts. of the mixture, for although the heavier dressings augmented the crop the extra cost of the artificial manures outweighed the value of the additional yield. Thus it was found that the addition of the first 4 cwts. of artificials to the dung gave an increase of 25 cwts. in the crop, but a further 4 cwts. of artificials returned only an additional 8 cwts. of potatoes, while a still further increase of 4 cwts. of artificials (making 12 cwts. in all) secured an addition of a further 6 cwts. only in the crop.

In connection with this point reference may also be made to the results recorded by Professor Patrick Wright. The chief object of the Scotch experiments was to ascertain whether artificial manures could be partially substituted for farmyard manure in the cultivation of the potato crop, and what manures would be most suitable for the purpose. Certain plots were accordingly manured with single dressings of dung alone, at the rate of 20 tons and 10 tons per acre respectively, and the yield from them compared with that obtained from a plot dressed with 10 tons of farmyard manure supplemented with $6\frac{1}{4}$ cwt. of a complete artificial manure. The results showed that the substitution of a complete artificial manure for the extra 10 tons of dung in the third case did not succeed in producing quite so large a crop as that obtained from the plot which received 20 tons of farmyard manure alone. The difference was, however, so small as to make it obvious that a slight increase in the artificials would have given a crop as large or larger than that grown on the latter plot, while the yield from the plot which received 10 tons of dung was 28 cwts. per acre short of that furnished by the section dressed with dung and artificials. Moreover, regarded from the points of view of money returns the Scotch experiments are held to have shown clearly that properly proportioned dressings of artificial manures are capable of forming

a perfectly adequate and effective substitute for 10 tons of farmyard manure, and that greater profits can be got by growing potatoes with such artificials combined with a moderate quantity of dung than by applying large quantities of farmyard manure alone.

It is interesting to note that the trials conducted north of the Tweed also confirmed the observations made in the course of the Yorkshire experiments that an increase in the quantity of manures applied did not afford a corresponding return in the crop. Thus a moderate dressing of 10 tons of farmyard manure per acre produced a large increase of crop over that obtained without manure, but additional applications of manure, either dung or artificials, did not secure a proportionately profitable augmentation of the crop. Similar results were recorded in the Lancashire experiments.

In order to ascertain the composition of the artificial manures best suited for potatoes in combination with dung, plots were arranged at each of the experimental centres referred to above for the determination of the effects of omitting nitrogen, phosphoric acid, and potash respectively from a compound manure applied to the potato crop. At Garforth there was a comparatively slight reduction in the yield when either of the first two was withheld, and a very marked diminution when potash was lacking. It was concluded, therefore, that of the three fertilising substances potash exercised the greatest influence on the potato crop, and that phosphoric acid was not so effective as nitrogen. This conclusion was confirmed by the observations made on the plots where large quantities of these three fertilising agents were in turn used with ordinary dressings of the other two. A further demonstration of the same point was afforded by the results at Cockle Park and in Scotland. At Cockle Park it was found that it was not profitable to add sulphate of ammonia and superphosphate alone to dung, but that the further addition of sulphate of potash* enabled the whole artificial dressing to give an average increase over

* From a comparison of the results obtained at Cockle Park with the different potash manures, it appears that sulphate of potash did better than kainit, and muriate of potash was much more effective than the sulphate.

dung alone of about 30 cwts. of tubers per acre at an additional cost of 37s. In the Scotch and Lancashire experiments it was also observed that potash exercised a powerful influence in adding to the yield of the potato crop and in increasing the size of the tubers.

On the whole, therefore, the results of the experiments at the three centres indicate that for the potato crop the best artificial manure to be applied with dung is a complete manure, *i.e.*, one containing the three substances nitrogen, phosphoric acid, and potash, and that the omission of any one of these substances causes a reduction alike in the crop and the profits. The necessity of including potash was clearly demonstrated at all the centres.

With respect to the question of the relative values of sulphate of ammonia and nitrate of soda as a source of nitrogen for the potato crop, the Yorkshire experiment furnished no marked indications that one is superior to the other, nor did the results of the trials in Scotland afford any conclusive evidence that either of these articles possesses any material advantage over the other.

THE MANUFACTURE OF CHEDDAR CHEESE.

The conditions essential to the manufacture of Cheddar cheese of high quality form the subject of some interesting remarks in a report prepared for the Board of Agriculture by Mr. F. J. Lloyd, F.C.S., F.I.C., on the results of the investigations carried out by him during the past eight years in connection with the cheese schools of the Bath and West and Southern Counties Society. It appears that the methods of making Cheddar cheese differ in almost every locality in which it is made, but although the processes followed may present considerable differences, the final results obtained are practically identical to the extent that the article produced is Cheddar cheese or cheese of the Cheddar type. In certain points, however, the character of the cheese made varies according to the system of manufacture adopted, particularly with respect to the duration of the process of ripening, and to the texture and consistency of the finished product. Thus, formerly a Cheddar cheese was not considered fit for consumption until it had been kept for twelve months, but now a rapidly-ripening cheese will be ready for market three months after it is made, while six months is a more common period. Hence the extreme methods have become known as "rapid" and "slow" ripening systems. Again, some methods offer greater facilities than others for the production of an article of uniform texture; and by some processes there is a tendency for the cheese to be hard, while by others a softer and

mellower curd is obtained, which has an important bearing on the quality. Still, in flavour there is apparently not much variety due to the system of manufacture, and after a careful investigation of the various methods, Mr. Lloyd is of opinion that as good a cheese can be made by any one of them as by any other. "As a rule," he says, "when a maker fails to make good cheese, it is not the fault of the system, but is due to want of cleanliness or want of sufficient skill. Nothing is more disastrous than for a maker who has not met with success to alter his system or to take up another. The only course for him to pursue is first to discover, from those who possess experience of the system which he has adopted, in what respects he has failed to carry the system out properly, and then to remedy these defects."

The characteristics of a good Cheddar cheese are described as follows :—

"A Cheddar cheese, when cut, should be soft and fat, neither hard nor crumbly. It should have both the aroma and flavour of a nut, the so-called "nutty flavour" so much sought after. It should melt in the mouth, producing not only an agreeable flavour, but leaving a most pleasant after-taste. It should taste neither sweet nor acid."

Among the conditions declared to be necessary for the production of cheese of this high quality, the first is the employment of perfectly clean milk of normal composition from healthy cows. The observance of this precaution as to the cleanliness and wholesomeness of the raw product is regarded as absolutely essential, for if it is neglected, no skill or care will ensure success.

Next in importance is the provision of a properly equipped dairy and cheese room, and notice may be taken here of some of the principal requirements of a good cheese dairy, as enumerated in Mr. Lloyd's report. The first consideration should be that the room be so placed as to be free from unpleasant smells. As a rule the pig styes are placed far too near the dairy, or the window of the dairy opens on the farm-yard, which is surrounded with horse-boxes or cattle stalls. In such cases the pig-styes or cattle stalls should not be used during the period of cheese-making. Another source

of foul air obtaining access to the dairy is the presence therein, or close by, of drains. There should on no account be any drain in the dairy. Instances have occurred where the cheese of the best makers has been spoiled, owing to the whey lead which stood in the dairy being connected with a drain which ran direct to the pig-styes, so that when the wind was in a certain quarter the foul gas in this drain found access to the dairy.

All the liquid from the dairy should pass out by an open surface course leading to, and opening over, an outside drain which is well trapped. In some farmhouses the privies, which are simply earth closets, are far too near the dairy and cannot fail to be the source of an impure atmosphere, which enters at the windows. Lastly, the dairy should be separated from the dwelling-house, and not, as is frequently the case, open into the kitchen or scullery. Nor should it be near the pantry. The old idea of converting the dairy into a pantry ought by this time to be exploded: still, fairly high game has been seen in recent years in a cheese dairy.

Within reason, the larger the room the better, though, if the atmosphere be kept pure and cool, it is quite possible to make good cheese in a small dairy. The room should by preference face the north. But if open to the east, or south, or west, the sun, during the time of making, must be prevented by blinds from shining into the room. Good ventilation is a primary necessity, and this should be obtained without draughts. It is best procured by two windows, which should be covered with fine wire gauze, so that when the windows are open there is less chance of a draught. Moreover, the wire gauze keeps out flies and insects, which are at times very troublesome. During the early spring, and again in the autumn, it will be necessary to keep the dairy heated. There is no better means of doing this than by a slow combustion stove. A similar stove will also be required in the cheese-ripening room.

The floor of the dairy should be of concrete or cement or well-laid stone, so that it may be level, and have no cracks in which milk or whey can lodge. The walls should be well plastered and whitewashed. An excellent wash for this

purpose is made with two-thirds white lime and one-third cement. Care must be taken to have no size in the white-wash, or it will attract flies to such an extent that they will become a nuisance. Against the walls there should be one or two wooden shelves and a small cupboard, both at such a height that they can readily be reached and so kept clean.

Then, with respect to the equipment of the dairy, it is recommended that only the utensils actually used in cheese-making, which are not numerous, should be kept in the dairy.

The cheese tub mainly in vogue is a round metal (tin-lined copper) tub, not jacketed, and provided with a very large tap the plug of which can be lifted out, raised on a wooden stand so as to be within easy reach of the cheese-maker and thus do away with needless stooping. No rim should be soldered on to the top of the tub.

In many dairies the milk and whey have to be carried outside the dairy in buckets and heated in large milk vessels standing in a copper of hot or boiling water. This operation entails much labour, and it has no apparent special advantage to recommend it. At the Cheese Schools of the Bath and West and Southern Counties Society the heating of the milk has always been done by means of steam in a warmer placed in the dairy, close to the cheese tub, the steam being generated in a boiler.

A metal cooler containing a rack, the cheese presses, a cheese mill, and a stool on which to place the cheese when it is being bandaged are the principal other utensils. The cheese presses are three in number, and the second should subject the cheese to greater pressure than the first, and the third to greater pressure than the second. It is very doubtful whether the ordinary cheese presses do this. The influence of varying pressures on the resulting cheeses is a subject which deserves investigation. Frequently the whey lead is kept in the dairy, but it is better, where possible, to keep it outside. A weighing-machine should be in the dairy to record the weight of each day's cheese before the cheese is taken to the ripening room. The smaller utensils are the strainer, the breaker, a skimmer and bowls, the rennet

measure, acidimeter, and record book, etc., etc.; these may also be kept in the dairy.

The cheese room should be above the dairy, and there should be a lift from one to the other, so that the cheeses can easily be removed from the latter. The floor of the cheese room should be of wood; it is most undesirable to have a cheese-ripening room with a stone floor, or one just above the ground. Freedom from dampness, uniform temperature, and ventilation are the chief necessities of a cheese-ripening room. At the same time no draught should ever play on a cheese while it is ripening, hence some precaution is necessary as to how the ventilation is obtained. The cheeses should be placed upon shelves and not on the floor of the room. It must not be forgotten that the top of the room will be warmer than the bottom, consequently the newest made cheese should be placed on the highest shelves. There should be in the cheese room a maximum and minimum thermometer, also a hygrometer. In cold weather the temperature must be kept constant by means of a stove.

Assuming that the conditions previously referred to are obtained, it will be necessary for the cheese-maker to possess a knowledge of their manipulation. The object that the practical cheese-maker has in view, whether consciously or unconsciously, in subjecting the milk and curd to the many operations requisite to the manufacture of a cheese, is to obtain the curd, with the least possible loss of fat, in such a condition that it will ripen into a good cheese. The tests applied by the maker to ensure this result are, it seems, usually empirical, and depend upon the senses of touch, taste, and smell. Hence the cause of failure to produce a first-class cheese is ascribed mainly to the operator not possessing naturally, or as the result of education or experience, the requisite delicacy or degree of sensitiveness in touch and taste and smell. For instance, some people can judge by the sense of taste with a fair degree of accuracy whether the curd is fit for grinding, while others seem utterly unable to do so. On the other hand, some are never able to form a correct judgment, by the sense of touch, of the condition of the curd when in scald, and

whether it is fit to allow the whey to be drawn, though frequently those who at a later stage are unable to estimate its fitness for grinding appear to have no difficulty in estimating whether the curd is fit to permit the whey to be drawn or not. From the drawing of the whey to the grinding of the curd every step in the manufacture, excepting the time curd remains piled, proceeds by time stages of certain duration, and no special aptitude is required until it becomes necessary to judge whether the curd is fit for grinding or not. This, without doubt, is the point where the greatest demand is made upon the cheese-maker's judgment, and when any serious error will hopelessly ruin the cheese. An error in judgment at any previous stage may, by a skilful maker, be very largely counteracted in subsequent operations, but an error at this stage is fatal. The determination of the proper condition of the curd for grinding has probably been the greatest difficulty the cheese-maker had to contend against in the past. How difficult it was may be seen from the variations shown by the following figures, obtained before the value of the acidimeter had been proved. On August 30th, 1891, the acidity of the liquid last coming from the curd before grinding was .84 per cent., three days before on the 27th it was .93, and three days before that, on the 24th, it was as high as 1.05 per cent. In September the acidity ranged from .87 on the 18th to 1.10 per cent. on the 15th, and in October from .92 on the 22nd to 1.15 per cent. on the 9th.

This difficulty could only be removed by the discovery of some means of ascertaining accurately the various stages in the progress of the curd which would not depend upon the rule of thumb tests hitherto followed. Mr. Lloyd's inquiries were early directed to the solution of this problem, with the result that it has been found that all those conditions which the cheese maker formerly had to judge by taste or smell are chemical conditions, which may be estimated with greater precision by means of an acidimeter. Thus, it appears that the fitness of the curd to settle in scald is coincident with the whey attaining an acidity approaching the acidity of the milk before renneting. By the employment of an acidity

apparatus the cheese-maker can determine the acidity of the whey, and so decide when to draw this off, and by so doing will secure not only the proper development of acidity in the future stages of cheese-making, but also materially diminish the time which the cheese takes to make. Moreover, it has been found that the acidity of the whey which drains from the curd, when in the cooler, is a sufficiently accurate guide to the condition of the curd before grinding, and by securing uniformity in this acidity, the cheese-maker can also ensure uniformity in the quality and ripening properties of the cheese. Whether the cheese be made on Cannon's system, Candy's system, or the Scotch system, the acidity of the liquid from the press must invariably be uniform from day to day. It should only vary within narrow limits. Speaking generally, the acidity of this liquid should never fall below 0.80 per cent., or rise above 1.20 per cent., and the nearer it can be kept to 1.00 per cent. the better.

But the accurate determination of these acidities will not alone ensure a good cheese. Equally important will it be to pay strict attention to temperature, time, and every other factor which can be accurately determined. These points must also be recorded. "No cheese-maker," Mr. Lloyd says, "can ever hope to attain success unless a careful record of the work done daily is kept; and every cheese, before being taken to the curing-room, should have sewn on it a label showing the date of manufacture. Then, whether the cheese be good or bad, it will be possible to turn back to the record and discover the cause of this success or failure."

With reference to the duration of the curing period, cheese-makers are reminded that a cheese, when ripe, is at its best, and that from that time it begins to deteriorate. The warmer the room in which the cheese is kept, the more rapid is both the ripening and the subsequent falling off. Hence it arises that cheese made late in the season keeps better and longer than that made early. The early made cheese is ripening in a continually rising temperature; the process of ripening is therefore continually increasing in rapidity. The late made

cheese ripens in a continually falling temperature, and therefore the process of ripening is week by week checked more and more. Consequently a cheese room requires to be artificially heated in the autumn or the cheeses will not properly ripen. The temperature of a cheese-ripening room should be about 65° F. The only possible means of checking the ripening of a cheese beyond a desirable point is to place it at once in a low temperature, 40° F. being recommended as a temperature which would agree with the dictates of science, though even at this low temperature certain changes may take place. In this connection it may be noted that if a cheese has been made from exceptionally pure milk, the changes which proceed in the cheese, after what may be termed complete ripeness has been reached, are such as will not materially injure the cheese, and they will proceed comparatively slowly. But if any taint was in the milk when the cheese was made, then the changes which take place after complete ripeness has been reached are more rapid and more destructive to the quality of the cheese.

AGRICULTURAL RETURNS OF GREAT BRITAIN, 1899.

PRELIMINARY STATEMENT for 1899, compiled from the
Returns collected on the 5th June; and comparison with
previous Years.

CROPS AND LIVE STOCK.										1899.	1898.	1897.
										<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
Wheat	..	..	..	..	..	..	..	..	..	2,000,981	2,102,206	1,889,161
Barley	..	..	..	..	..	..	..	..	..	1,922,103	1,903,666	2,035,790
Oats	..	..	..	..	..	..	..	..	..	2,959,755	2,917,760	3,036,056
Potatoes	..	..	..	..	..	..	..	..	..	547,682	524,591	504,914
Clover and Rotation Grasses { For Hay.. ..										2,214,883	2,381,551	2,285,965
{ Not for Hay										2,593,068	2,529,799	2,567,843
TOTAL										4,807,951	4,911,350	4,853,808
Permanent Pasture { For Hay										4,339,025	4,536,315	4,510,333
{ Not for Hay										12,291,062	12,023,077	12,002,535
TOTAL										16,630,687	16,559,392	16,512,868
Hops	..	..	..	..	..	..	..	..	..	51,843	49,735	50,863
Cows and Heifers in Milk or in Calf.. ..										<i>No.</i>	<i>No.</i>	<i>No.</i>
Other Cattle :—2 Years and above										2,671,260	2,587,190	2,532,379
" 1 Year and under 2										1,341,310	1,381,595	1,323,230
" Under 1 Year										1,388,511	1,345,844	1,360,741
TOTAL OF CATTLE										1,394,639	1,307,735	1,284,147
Ewes kept for Breeding										10,460,837	10,137,932	10,006,697
Other Sheep :—1 Year and above										6,040,600	6,203,858	6,219,001
" Under 1 Year										10,736,227	10,401,404	10,114,742
TOTAL OF SHEEP										27,237,664	26,743,194	26,340,440
Sows kept for Breeding										375,911	362,200	334,244
Other Pigs										2,247,902	2,089,395	2,008,058
TOTAL OF PIGS										2,623,813	2,451,595	2,342,302

1899 COMPARED WITH 1898.

CROPS AND LIVE STOCK.										Increase.		Decrease.	
										<i>Acres.</i>	<i>Per Cent.</i>	<i>Acres.</i>	<i>Per Cent.</i>
Wheat	..	..	..	..	..	..	..	..	..	..	..	101,225	4'8
Barley	..	..	..	..	..	..	..	..	..	78,442	4'1	..	..
Oats	..	..	..	..	..	..	..	..	..	41,995	1'4	..	..
Potatoes	..	..	..	..	..	..	..	..	..	23,091	4'4	..	..
Clover and Rotation Grasses { For Hay.. ..										..	..	166,668	7'0
{ Not for Hay										63,269	2'5	..	..
TOTAL .. ..										..	..	103,399	2'1
Permanent Pasture { For Hay .. ..										..	..	197,290	4'3
{ Not for Hay										268,585	2'2	..	..
TOTAL										71,295	0'4	..	..
Hops	..	..	..	..	..	..	..	..	..	2,108	4'2	..	..
Cows and Heifers in Milk or in Calf										<i>No.</i>	<i>Per Cent.</i>	<i>No.</i>	<i>Per Cent.</i>
Other Cattle :—2 years and above										84,070	3'2	..	..
" 1 year and under 2 .. ..										..	..	40,285	2'9
" Under 1 year										42,667	3'2	..	..
TOTAL OF CATTLE										86,904	6'6	..	..
Ewes kept for Breeding										173,356	2'6	..	..
Other Sheep :—1 year and above										322,905	3'2	..	..
" Under 1 year										334,823	3'2	103,250	2'6
TOTAL OF SHEEP										494,470	1'8	..	..
Sows kept for Breeding										13,711	3'8	..	..
Other Pigs										158,507	7'6	..	..
TOTAL OF PIGS										172,218	7'0	..	..

COUNTY SUMMARY.—ACREAGE

PRELIMINARY STATEMENT of the ACREAGE under WHEAT,
compiled from the Returns collected on the 5th June,

COUNTIES.	Wheat.		Barley.		Oats.	
	1899.	1898.	1899.	1898.	1899.	1898.
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
TOTAL FOR GREAT BRITAIN }	2,000,981	2,102,206	1,982,108	1,903,666	2,959,755	2,917,760
ENGLAND - - -	1,899,827	1,987,385	1,635,634	1,562,761	1,781,649	1,731,157
WALES - - -	53,898	58,960	105,978	102,921	220,233	230,670
SCOTLAND - - -	47,256	55,861	240,496	237,984	957,873	955,933
ENGLAND.						
BEDFORD - - -	40,528	42,145	19,484	19,063	16,748	14,955
BERKS - - -	39,301	40,150	26,886	25,293	30,857	29,406
BUCKINGHAM - - -	37,042	37,199	17,693	17,454	27,959	26,808
CAMBRIDGE - - -	101,235	102,955	52,924	52,973	45,366	42,742
CHESTER - - -	16,252	17,950	1,883	1,387	61,009	60,070
CORNWALL - - -	30,773	31,621	31,905	29,771	62,464	64,789
CUMBERLAND - - -	3,578	4,223	2,350	2,136	73,918	75,376
DERBY - - -	15,656	16,579	6,152	5,541	25,038	24,260
DEVON - - -	65,094	71,156	42,797	39,947	117,101	117,600
DORSET - - -	25,060	26,611	27,951	25,856	26,392	26,427
DURHAM - - -	15,131	17,781	17,114	15,053	32,723	32,151
ESSEX - - -	126,244	124,861	86,778	84,767	55,367	50,571
GLOUCESTER - - -	52,717	55,084	27,376	24,606	31,008	30,855
HANTS - - -	65,969	67,079	39,615	37,019	74,711	72,624
HEREFORD - - -	29,078	31,833	20,061	18,530	22,819	21,334
HERTFORD - - -	54,755	54,152	29,037	27,529	32,943	32,132
HUNTINGDON - - -	34,028	33,729	20,696	19,523	11,744	11,341
KENT - - -	50,757	53,494	36,546	36,535	45,315	43,804
LANCASTER - - -	20,145	22,146	6,627	6,389	73,350	70,812
LEICESTER - - -	24,730	25,562	13,634	12,510	25,088	25,070
LINCOLN - - -	195,004	207,425	208,497	194,802	117,156	114,777
LONDON - - -	240	210	40	43	153	158
MIDDLESEX - - -	3,543	3,643	969	1,013	2,733	2,454
MONMOUTH - - -	7,384	8,168	5,002	4,745	8,605	8,507
NORFOLK - - -	140,173	144,133	198,466	197,360	54,887	49,690
NORTHAMPTON - - -	47,633	49,840	43,897	41,891	24,673	22,245
NORTHUMBERLAND - - -	7,581	9,688	34,093	32,028	44,386	44,116
NOTTS - - -	41,545	43,824	38,800	35,518	32,485	31,591
OXFORD - - -	40,082	40,995	41,783	39,496	29,616	28,018
RUTLAND - - -	5,292	5,425	10,590	10,494	3,674	3,634
SALOP - - -	35,998	42,395	55,438	49,370	38,011	37,904
SOMERSET - - -	37,999	39,317	25,029	22,989	25,997	25,597
STAFFORD - - -	24,620	25,581	17,307	15,300	36,560	36,371
SUFFOLK - - -	115,711	116,986	139,879	138,504	35,267	30,822
SURREY - - -	21,532	22,812	7,926	7,497	23,005	22,116
SUSSEX - - -	56,508	57,747	10,405	10,899	59,852	58,504
WARWICK - - -	38,311	39,835	13,696	12,483	28,493	27,405
WESTMORLAND - - -	177	225	897	633	15,387	16,163
WILTS - - -	57,630	57,682	39,918	38,447	44,133	43,331
WORCESTER - - -	34,066	35,418	9,580	9,260	17,999	16,472
YORK, E. RIDING - - -	64,562	69,144	72,483	72,737	96,993	93,053
„ N. RIDING - - -	27,857	34,034	75,158	70,264	73,724	72,043
„ W. RIDING - - -	48,306	56,548	58,182	55,106	75,880	73,059

OF WHEAT, BARLEY, AND OATS.

BARLEY, and OATS in the several COUNTIES of GREAT BRITAIN, 1899, with a COMPARATIVE STATEMENT for 1898.

COUNTIES (Continued).	Wheat.		Barley.		Oats.	
	1899.	1898.	1899.	1898.	1899.	1898.
WALES.	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
ANGLESEY - - -	278	209	1,649	1,721	21,354	22,250
BRECON - - -	3,793	3,979	4,772	4,584	13,134	13,440
CARDIGAN - - -	6,056	6,430	15,726	15,567	27,753	29,514
CARMARTHEN - - -	8,738	8,803	14,103	13,837	29,851	32,568
CARNARVON - - -	466	450	5,832	5,970	10,860	11,437
DENBIGH - - -	6,280	7,390	14,792	14,383	25,105	26,621
FLINT - - -	4,754	5,592	5,751	5,415	11,691	11,942
GLAMORGAN - - -	5,756	6,308	7,899	7,106	11,673	11,892
MERIONETH - - -	879	867	4,085	4,135	9,109	9,889
MONTGOMERY - - -	10,344	12,013	8,954	8,336	21,301	21,796
PEMBROKE - - -	3,333	3,475	18,757	18,460	26,581	27,160
RADNOR - - -	3,221	3,444	3,658	3,407	11,821	12,161
SCOTLAND.						
ABERDEEN - - -	4	21	29,415	32,942	184,478	181,546
ARGYLL - - -	5	...	1,726	1,578	17,326	17,847
AYR - - -	1,197	1,992	1,634	1,401	45,271	44,851
BANFF - - -	24	7	10,504	11,725	46,874	45,714
BERWICK - - -	2,120	3,214	21,143	19,032	33,375	33,441
BUTE - - -	12	25	85	141	4,954	4,972
CAITHNESS - - -	1	...	1,257	1,105	33,758	34,138
CLACKMANNAN - - -	214	355	591	428	3,021	3,064
DUMBARTON - - -	978	1,123	246	210	6,842	6,896
DUMFRIES - - -	142	137	831	783	43,370	43,937
EDINBURGH - - -	4,158	5,053	5,804	4,739	22,812	23,241
ELGIN or MORAY - - -	1,209	1,315	14,432	15,194	20,213	19,645
FIFE - - -	9,270	10,450	22,475	21,341	38,732	39,044
FORFAR - - -	8,572	8,439	30,095	29,549	47,858	47,836
HADDINGTON - - -	5,087	6,349	16,382	14,714	17,314	17,403
INVERNESS - - -	5	60	7,502	7,695	30,051	29,850
KINCARDINE - - -	692	526	13,520	13,925	27,517	27,793
KINROSS - - -	32	34	486	421	6,297	6,366
KIRKCUDBRIGHT - - -	104	107	106	78	27,255	27,536
LANARK - - -	2,184	2,567	409	350	37,651	37,691
LINLITHGOW - - -	1,296	1,527	3,498	3,035	9,778	9,740
NAIRN - - -	1	27	3,447	3,607	5,491	5,315
ORKNEY - - -	...	...	4,600	4,711	33,620	33,479
PEEBLES - - -	7	13	459	381	8,164	8,174
PERTH - - -	5,104	6,096	15,398	14,672	64,553	63,985
RENFREW - - -	1,687	1,879	57	131	11,249	11,330
ROSS and CROMARTY - - -	813	1,090	12,853	13,200	29,685	29,510
ROXBURGH - - -	518	779	13,231	12,379	29,028	29,540
SELKIRK - - -	...	7	476	480	4,746	5,050
SHETLAND - - -	...	...	2,003	1,982	7,292	7,387
STIRLING - - -	1,361	2,109	3,497	3,093	17,965	18,296
SUTHERLAND - - -	...	...	1,387	1,476	7,862	7,887
WIGTOWN - - -	459	560	947	886	33,471	33,519

COUNTY SUMMARY.—ACREAGE OF

PRELIMINARY STATEMENT of the ACREAGE under CLOVER and
compiled from the Returns collected on the

COUNTIES.	Clover and Rotation Grasses.					
	FOR HAY.		NOT FOR HAY.		TOTAL.	
	1899.	1898.	1899.	1898.	1899.	1898.
TOTAL FOR GREAT BRITAIN -	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
	2,214,883	2,381,551	2,593,068	2,529,799	4,807,951	4,911,350
ENGLAND - -	1,622,603	1,779,341	1,184,007	1,143,467	2,806,610	2,922,808
WALES - -	198,046	199,959	196,641	180,599	394,687	380,558
SCOTLAND - -	394,234	402,251	1,212,420	1,205,733	1,606,654	1,607,984
ENGLAND.						
BEDFORD - -	18,486	20,334	7,846	7,062	26,332	27,396
BERKS - -	34,015	38,229	9,670	8,229	43,685	46,458
BUCKINGHAM - -	25,192	28,995	6,680	6,427	31,872	35,422
CAMBRIDGE - -	35,210	38,449	22,964	20,262	58,174	58,711
CHESTER - -	57,890	60,779	15,255	14,586	73,145	75,365
CORNWALL - -	49,042	52,737	137,378	133,829	186,420	186,566
CUMBERLAND - -	41,651	42,544	73,564	75,915	115,215	118,459
DERBY - -	18,393	19,932	7,024	7,097	25,417	27,029
DEVON - -	71,243	83,086	147,635	142,663	218,878	225,749
DORSET - -	28,691	32,067	17,655	15,855	46,346	47,922
DURHAM - -	39,931	41,675	13,587	13,806	53,518	55,481
ESSEX - -	62,837	73,443	36,527	36,618	99,364	107,061
GLOUCESTER - -	52,869	59,086	36,931	33,400	89,800	92,486
HANTS - -	83,136	90,848	29,977	27,071	113,113	117,919
HEREFORD - -	22,122	24,799	15,481	15,823	37,603	40,622
HERTFORD - -	35,599	39,154	9,775	9,227	45,374	48,381
HUNTINGDON - -	11,505	13,264	5,755	6,034	17,260	19,298
KENT - -	39,154	42,531	13,795	11,492	52,949	54,023
LANCASTER - -	72,528	75,774	11,630	12,007	84,158	87,781
LEICESTER - -	18,100	20,130	6,046	6,763	24,146	26,893
LINCOLN - -	88,865	98,975	104,826	105,064	193,691	204,039
LONDON - -	122	154	26	119	148	273
MIDDLESEX - -	1,991	2,005	526	828	2,517	2,833
MONMOUTH - -	10,637	12,061	4,253	4,495	14,890	16,556
NORFOLK - -	129,954	137,697	34,629	30,043	164,583	167,740
NORTHAMPTON - -	22,309	26,311	9,673	10,568	31,982	36,879
NORTHUMBERLAND - -	40,672	43,081	36,234	37,601	76,906	80,682
NOTTS - -	26,740	28,679	29,311	28,873	56,051	57,552
OXFORD - -	36,941	42,345	14,478	12,282	51,419	54,627
RUTLAND - -	3,288	3,392	3,517	2,905	6,805	6,297
SALOP - -	45,072	47,961	25,440	24,490	70,512	72,451
SOMERSET - -	27,323	32,127	24,554	23,368	51,877	55,495
STAFFORD - -	31,223	35,429	15,827	14,269	47,050	49,698
SUFFOLK - -	65,158	73,548	40,654	37,101	105,812	110,649
SURREY - -	18,132	20,215	5,173	5,485	23,305	25,700
SUSSEX - -	42,695	47,554	17,484	16,753	60,179	64,307
WARWICK - -	24,817	29,085	9,574	9,742	34,391	38,827
WESTMORLAND - -	6,987	7,205	9,556	9,578	16,543	16,783
WILTS - -	56,211	61,613	19,189	16,211	75,400	77,824
WORCESTER - -	17,576	19,949	10,165	9,879	27,741	29,828
YORK, E. RIDING - -	22,734	22,242	75,005	74,590	97,739	96,832
„ N. RIDING - -	38,633	40,301	37,152	37,048	75,785	77,349
„ W. RIDING - -	46,929	49,556	31,586	31,009	78,515	80,565

CLOVER AND ROTATION GRASSES.

ROTATION GRASSES in the several COUNTIES of GREAT BRITAIN,
5th June, 1899, with a COMPARATIVE STATEMENT for 1898.

COUNTIES (Continued).	Clover and Rotation Grasses.					
	FOR HAY.		NOT FOR HAY.		TOTAL.	
	1899.	1898.	1899.	1898.	1899.	1898.
WALES.	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
ANGLESEY - - -	21,203	21,146	21,475	17,635	42,678	38,781
BRECON - - -	8,379	8,940	13,233	11,671	21,612	19,711
CARDIGAN - - -	21,332	21,537	28,035	28,710	49,367	50,247
CARMARTHEN - - -	19,524	18,700	14,454	11,739	33,978	30,439
CARNARVON - - -	20,058	19,859	21,137	19,280	41,195	39,139
DENBIGH - - -	24,747	25,406	28,881	27,104	53,628	52,510
FLINT - - -	14,041	14,161	9,654	8,328	23,695	22,489
GLAMORGAN - - -	15,957	15,876	7,573	6,685	23,530	22,561
MERIONETH - - -	9,518	9,029	9,623	8,278	19,141	17,307
MONTGOMERY - - -	17,354	18,313	14,649	13,833	32,003	32,146
PEMBROKE - - -	18,624	20,060	19,120	18,987	37,744	39,047
RADNOR - - -	7,309	7,832	8,807	8,349	16,116	16,181
SCOTLAND.						
ABERDEEN - - -	45,137	46,159	238,831	235,563	283,968	281,722
ARGYLL - - -	11,568	11,235	16,239	16,304	27,807	27,539
AYR - - -	31,377	31,701	71,267	72,443	102,644	104,144
BANFF - - -	9,062	9,413	58,603	56,108	67,665	65,521
BERWICK - - -	9,217	9,563	48,995	49,670	58,182	59,233
BUTE - - -	2,007	2,186	6,298	6,655	8,305	8,841
CAITHNESS - - -	9,341	9,243	22,864	23,000	32,205	32,243
CLACKMANNAN - - -	1,790	1,779	1,684	1,903	3,474	3,682
DUMBARTON - - -	7,030	6,885	9,386	8,684	16,416	15,569
DUMFRIES - - -	17,706	17,877	63,132	64,937	80,838	82,814
EDINBURGH - - -	12,249	13,049	20,564	19,189	32,813	32,238
ELGIN, or MORAY - - -	5,424	5,348	33,540	32,720	38,964	38,068
FIFE - - -	25,812	27,179	39,755	41,425	65,567	68,604
FORFAR - - -	19,055	19,686	67,579	65,927	86,634	85,613
HADDINGTON - - -	10,147	10,517	17,392	17,110	27,539	27,627
INVERNESS - - -	11,361	11,518	20,004	19,135	31,395	30,653
KINCARDINE - - -	12,565	12,659	35,692	35,559	48,257	48,218
KINROSS - - -	2,531	2,623	10,045	9,451	12,576	12,074
KIRKCUDBRIGHT - - -	9,010	8,977	54,338	53,790	63,348	62,767
LANARK - - -	34,490	35,645	67,516	68,763	102,006	104,408
LINLITHGOW - - -	6,905	7,338	8,149	8,163	15,054	15,501
NAIRN - - -	1,896	1,720	8,118	8,044	10,014	9,764
ORKNEY - - -	8,872	7,353	24,933	26,516	33,805	33,869
PEEBLES - - -	2,126	2,053	16,128	15,347	18,254	17,400
PERTH - - -	29,351	29,998	71,020	70,063	100,371	100,061
RENFREW - - -	13,945	14,467	10,828	12,301	24,773	26,768
ROSS and CROMARTY - - -	13,555	14,085	29,664	29,342	43,219	43,427
ROXBURGH - - -	7,624	8,971	45,026	45,388	52,650	54,359
SELKIRK - - -	989	1,142	8,127	7,628	9,116	8,770
SETLAND - - -	706	751	539	583	1,245	1,334
STIRLING - - -	12,642	12,561	18,899	18,741	31,541	31,302
SUTHERLAND - - -	4,136	3,936	4,926	4,897	9,062	8,833
WIGTOWN - - -	4,608	4,634	62,369	60,384	66,977	65,018

COUNTY SUMMARY.—ACREAGE

PRELIMINARY STATEMENT of the ACREAGE under Permanent
from the Returns collected on the 5th June, 1899,

COUNTIES.	Permanent Pasture.					
	FOR HAY.		NOT FOR HAY.		TOTAL.	
	1899.	1898.	1899.	1898.	1899.	1898.
TOTAL FOR GREAT BRITAIN	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
	4,339,025	4,536,315	12,291,662	12,023,077	16,630,687	16,559,392
ENGLAND - - -	3,753,807	3,932,220	9,570,293	9,322,129	13,324,100	13,254,349
WALES - - -	457,173	474,492	1,462,437	1,449,337	1,919,610	1,923,829
SCOTLAND - - -	128,045	129,603	1,258,932	1,251,611	1,386,977	1,381,214
ENGLAND.						
BEDFORD - - -	28,552	32,109	73,218	69,191	101,770	101,300
BERKS - - -	70,627	73,891	97,090	91,762	167,717	165,653
BUCKINGHAM - - -	88,441	92,815	154,369	147,076	242,810	239,891
CAMBRIDGE - - -	35,889	39,198	81,833	78,854	117,722	118,052
CHESTER - - -	87,604	93,760	249,188	242,512	336,882	336,272
CORNWALL - - -	32,381	32,807	208,269	205,239	240,590	238,046
CUMBERLAND - - -	70,017	70,784	272,386	265,540	342,403	336,324
DERBY - - -	127,315	132,497	273,700	267,594	401,015	400,091
DEVON - - -	110,261	112,856	523,766	510,546	634,027	623,402
DORSET - - -	89,490	93,570	208,819	204,407	298,309	297,977
DURHAM - - -	91,512	92,292	187,338	185,881	278,850	278,173
ESSEX - - -	99,473	106,361	166,574	160,774	266,047	267,135
GLOUCESTER - - -	143,227	153,848	250,277	237,502	393,504	391,350
HANTS - - -	87,297	92,938	192,777	184,139	280,074	277,077
HEREFORD - - -	77,594	80,743	216,560	210,304	294,154	291,047
HERTFORD - - -	55,681	57,307	63,352	61,543	119,033	118,850
HUNTINGDON - - -	23,352	24,787	62,717	62,018	86,069	86,805
KENT - - -	101,997	109,751	306,677	296,856	408,674	406,607
LANCASTER - - -	195,118	197,104	380,496	375,735	575,614	572,839
LEICESTER - - -	87,763	95,173	269,125	260,872	356,888	356,045
LINCOLN - - -	90,723	96,779	407,412	397,926	498,135	494,705
LONDON - - -	3,719	3,790	5,203	5,517	8,922	9,307
MIDDLESEX - - -	40,308	47,927	27,632	27,502	73,940	75,429
MONMOUTH - - -	64,714	67,333	130,692	125,914	195,406	193,247
NORFOLK - - -	46,677	52,253	242,465	238,794	289,142	291,047
NORTHAMPTON - - -	78,732	83,325	275,265	267,357	353,997	350,682
NORTHUMBERLAND - - -	68,293	70,475	422,532	418,601	490,825	489,076
NOTTS - - -	64,032	67,182	144,129	141,459	208,161	208,641
OXFORD - - -	70,513	75,950	119,835	113,081	190,348	189,031
RUTLAND - - -	10,336	11,722	41,080	40,324	51,416	52,046
SALOP - - -	95,798	102,279	360,663	351,032	456,461	453,311
SOMERSET - - -	226,399	236,729	426,362	414,341	652,761	651,070
STAFFORD - - -	117,564	124,363	308,564	300,456	426,128	424,819
SUFFOLK - - -	59,038	64,619	120,804	119,016	179,842	183,635
SURREY - - -	71,700	74,171	84,248	80,296	155,948	154,467
SUSSEX - - -	127,430	135,925	263,557	251,842	390,987	387,767
WARWICK - - -	95,692	100,606	236,934	227,787	332,626	328,483
WESTMORLAND - - -	53,199	53,383	152,706	153,029	205,905	206,412
WILTS - - -	139,797	146,655	281,980	274,638	421,777	421,293
WORCESTER - - -	85,960	92,061	164,927	157,700	250,887	249,761
YORK, E. RIDING - - -	37,247	38,617	169,748	167,388	206,995	206,005
„ N. RIDING - - -	136,988	137,577	378,672	375,505	515,660	513,082
„ W. RIDING - - -	259,267	263,818	566,412	554,279	825,679	818,097

OF PERMANENT PASTURE.

PASTURE in the several COUNTIES of GREAT BRITAIN, compiled with a COMPARATIVE STATEMENT for 1898.

COUNTIES (Continued).	Permanent Pasture.					
	FOR HAY.		NOT FOR HAY.		TOTAL.	
	1899.	1898.	1899.	1898.	1899.	1898.
WALES.	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
ANGLESEY - - -	12,774	13,893	64,205	65,890	76,979	79,783
BRECON - - -	35,266	36,797	115,882	116,262	151,148	153,059
CARDIGAN - - -	35,521	37,236	122,168	117,589	157,689	154,825
CARMARTHEN - - -	74,586	77,576	268,858	266,519	343,444	344,095
CARNARVON - - -	38,125	38,098	77,585	80,178	115,710	118,276
DENBIGH - - -	30,971	33,370	121,904	119,524	152,875	152,894
FLINT - - -	17,084	18,305	54,646	53,729	71,730	72,094
GLAMORGAN - - -	68,562	70,954	143,819	143,284	212,381	214,238
MERIONETH - - -	34,413	35,947	81,459	81,130	115,872	117,077
MONTGOMERY - - -	45,259	45,836	143,412	140,686	188,671	186,522
PEMBROKE - - -	40,690	42,491	172,246	168,614	212,936	211,105
RADNOR - - -	23,922	23,929	96,253	95,932	120,175	119,861
SCOTLAND.						
ABERDEEN - - -	662	1,023	29,901	31,079	30,563	32,102
ARGYLL - - -	13,498	13,285	62,639	61,447	76,137	74,732
AYR - - -	16,344	16,132	136,159	134,781	152,503	150,913
BANFF - - -	406	765	9,420	11,010	9,826	11,775
BERWICK - - -	1,873	1,307	41,105	40,942	42,978	42,249
BUTE - - -	364	430	9,043	8,304	9,407	8,734
CAITHNESS - - -	1,710	1,593	26,728	26,864	28,438	28,457
CLACKMANNAN - - -	591	600	5,978	5,678	6,569	6,278
DUMBARTON - - -	1,485	1,805	20,947	21,506	22,432	23,311
DUMFRIES - - -	18,589	18,255	92,201	89,034	110,790	107,289
EDINBURGH - - -	1,795	1,839	45,484	47,994	47,279	49,833
ELGIN, or MORAY - - -	197	490	8,176	8,306	8,373	8,796
FIFE - - -	3,844	4,474	72,051	68,637	75,895	73,111
FORFAR - - -	1,167	1,944	27,769	29,244	28,936	31,188
HADDINGTON - - -	1,231	924	18,621	19,325	19,852	20,249
INVERNESS - - -	4,891	5,114	56,849	58,717	61,740	63,831
KINCARDINE - - -	60	190	8,682	8,627	8,742	8,817
KINROSS - - -	718	850	11,605	11,900	12,323	12,750
KIRKCUDBRIGHT - - -	12,642	12,482	72,203	72,501	84,845	84,983
LANARK - - -	8,661	8,614	85,073	83,150	93,734	91,764
LINLITHGOW - - -	654	776	21,802	21,762	22,456	22,538
NAIRN - - -	30	81	2,057	2,188	2,087	2,269
ORKNEY - - -	968	712	16,472	15,993	17,440	16,705
PEEBLES - - -	1,344	1,563	15,325	15,620	16,669	17,183
PERTH - - -	9,358	9,681	95,788	96,396	105,146	106,077
RENFREW - - -	5,461	5,003	43,090	40,982	48,551	45,985
ROSS and CROMARTY - - -	2,268	2,009	27,074	26,831	29,342	28,840
ROXBURGH - - -	6,362	6,235	55,874	52,010	62,236	58,245
SELKIRK - - -	1,314	1,406	11,077	11,131	12,391	12,537
SHETLAND - - -	1,506	1,519	42,211	42,182	43,717	43,701
STIRLING - - -	3,292	3,542	48,725	48,067	52,017	51,609
SUTHERLAND - - -	1,141	1,259	8,389	7,847	9,530	9,106
WIGTOWN - - -	3,619	3,701	39,414	31,556	34,933	35,257

COUNTY SUMMARY—LIVE STOCK.

PRELIMINARY STATEMENT of the NUMBER of CATTLE, SHEEP, and PIGS in the several COUNTIES of GREAT BRITAIN, compiled from the RETURNS collected on the 5th June, 1899, with a COMPARATIVE STATEMENT for 1898.

COUNTIES.	Cattle.		Sheep.		Pigs.	
	1899.	1898.	1899.	1898.	1899.	1898.
	No.	No.	No.	No.	No.	No.
TOTAL FOR GREAT BRITAIN	6,795,720	6,622,364	27,237,664	26,743,194	2,623,813	2,451,595
ENGLAND	4,841,852	4,674,303	16,260,327	15,886,538	2,225,420	2,078,898
WALES	736,691	701,777	3,416,357	3,268,708	258,154	238,581
SCOTLAND	1,217,177	1,246,284	7,560,980	7,587,948	140,239	134,116
ENGLAND.						
BEDFORD	34,576	32,658	105,914	101,159	27,385	25,387
BERKS	44,974	43,504	184,624	173,918	25,455	25,349
BUCKINGHAM	74,830	71,786	200,008	197,262	32,445	30,533
CAMBRIDGE	56,123	53,436	214,422	209,949	48,472	49,658
CHESTER	182,231	176,256	107,173	94,256	76,627	73,467
CORNWALL	199,148	192,585	416,137	406,229	94,486	83,416
CUMBERLAND	149,313	144,158	594,820	594,113	22,781	21,672
DERBY	141,387	137,835	175,698	172,142	34,596	30,550
DEVON	275,997	266,144	882,526	870,770	109,184	101,470
DORSET	89,128	86,380	374,740	365,310	59,077	57,175
DURHAM	76,029	74,240	251,856	243,431	11,841	13,129
ESSEX	90,377	89,550	295,051	287,641	88,743	84,774
GLOUCESTER	124,867	117,685	374,041	357,262	76,681	70,317
HANTS	87,282	84,344	394,318	388,706	70,552	68,148
HEREFORD	94,802	89,353	336,095	323,366	29,689	25,533
HERTFORD	35,895	35,151	117,816	118,040	25,553	24,083
HUNTINGDON	30,432	30,007	99,972	99,210	18,768	18,332
KENT	78,572	77,037	942,645	937,261	63,133	57,282
LANCASTER	243,581	237,151	346,524	332,260	60,766	54,801
LEICESTER	140,399	133,656	334,507	329,903	26,579	24,624
LINCOLN	252,214	244,372	1,217,892	1,203,677	106,505	99,249
LONDON	5,866	6,253	5,846	5,437	2,607	2,574
MIDDLESEX	16,742	17,096	18,717	19,116	13,271	12,456
MONMOUTH	48,615	45,822	223,186	213,238	17,755	16,646
NORFOLK	139,760	138,785	541,132	531,048	105,739	97,745
NORTHAMPTON	126,539	121,683	414,484	406,877	31,198	28,899
NORTHUMBERLAND	117,424	112,012	1,086,625	1,074,939	11,650	10,848
NOTTS	83,490	81,449	208,884	211,450	31,083	29,388
OXFORD	60,695	57,835	244,431	235,827	36,595	33,389
RUTLAND	19,235	17,924	85,420	84,167	2,251	2,021
SALOP	177,456	167,587	476,108	451,740	75,140	69,377
SOMERSET	240,731	229,722	542,458	538,225	133,938	124,277
STAFFORD	162,923	156,782	251,246	247,907	56,249	52,395
SUFFOLK	79,834	77,081	432,803	404,283	157,953	144,793
SURREY	45,021	43,994	72,630	72,231	21,943	21,401
SUSSEX	115,667	112,679	440,278	436,800	42,594	40,667
WARWICK	106,884	102,536	280,556	274,670	39,666	36,943
WESTMORLAND	68,146	65,641	380,900	368,727	4,695	4,217
WILTS	116,449	111,568	531,843	513,729	67,560	66,257
WORCESTER	68,035	64,282	173,942	169,947	44,231	41,159
YORK, E. RIDING	89,940	88,560	462,128	453,681	63,400	59,105
„ N. RIDING	175,264	171,099	727,512	704,235	58,765	54,458
„ W. RIDING	275,069	266,565	692,319	662,399	98,059	90,934

(Continued on the next page.)

COUNTY SUMMARY—LIVE STOCK—(continued).

PRELIMINARY STATEMENT of the NUMBER of CATTLE, SHEEP, and PIGS, in the several COUNTIES of GREAT BRITAIN, compiled from the Returns collected on the 5th June, 1899, with a COMPARATIVE STATEMENT for 1898.

COUNTIES (Continued).	Cattle.		Sheep.		Pigs.	
	1899.	1898.	1899.	1898.	1899.	1898.
WALES.	No.	No.	No.	No.	No.	No.
ANGLESEY - - -	54,082	51,582	76,625	71,748	18,685	17,477
BRECON - - -	41,335	39,014	496,665	485,094	9,586	8,864
CARDIGAN - - -	69,200	65,168	203,551	255,020	24,927	23,383
CARMARTHEN - - -	120,416	114,756	276,444	263,217	40,366	38,651
CARNARVON - - -	56,254	53,918	257,671	244,573	21,589	21,470
DENBIGH - - -	68,082	64,979	340,371	315,422	31,872	27,406
FLINT - - -	36,762	34,882	84,984	75,431	20,521	18,434
GLAMORGAN - - -	55,387	52,140	328,022	326,110	17,823	16,634
MERIONETH - - -	38,783	37,584	434,895	418,826	9,379	8,771
MONTGOMERY - - -	72,080	69,021	428,330	401,158	26,373	22,678
PEMBROKE - - -	90,281	86,709	140,032	134,500	31,312	29,691
RADNOR - - -	34,029	32,024	288,767	277,609	5,721	5,122
SCOTLAND.						
ABERDEEN - - -	175,407	183,212	232,863	223,490	12,346	11,417
ARGYLL - - -	61,698	63,263	984,304	1,019,728	4,285	4,147
AYR - - -	101,885	101,717	386,098	385,336	13,920	12,498
BANFF - - -	44,561	45,513	71,400	67,474	2,735	2,713
BERWICK - - -	16,832	18,091	315,958	321,587	3,796	3,632
BUTE - - -	9,751	9,828	47,897	49,061	621	713
CAITHNESS - - -	21,780	22,325	130,006	122,970	1,495	1,424
CLACKMANNAN - - -	3,686	4,124	14,446	14,672	1,729	1,901
DUMBARTON - - -	15,384	15,311	76,287	78,290	1,339	1,589
DUMFRIES - - -	62,016	60,382	565,490	566,983	10,915	9,794
EDINBURGH - - -	21,450	21,499	191,403	191,196	8,194	7,792
ELGIN, or MORAY - - -	22,296	23,898	72,514	70,544	2,472	2,534
FIFE - - -	51,020	52,748	121,539	121,577	5,519	5,047
FORFAR - - -	51,668	56,144	167,219	165,020	6,743	6,246
HADDINGTON - - -	10,115	11,530	131,221	131,580	2,171	1,756
INVERNESS - - -	52,321	53,314	628,695	644,667	2,669	2,567
KINCARDINE - - -	25,752	27,936	44,483	43,905	2,544	2,450
KINROSS - - -	7,091	6,892	40,920	39,502	671	523
KIRKCUDBRIGHT - - -	49,539	49,175	399,338	405,726	8,265	7,745
LANARK - - -	75,408	75,318	252,199	248,818	7,213	8,025
LINLITHGOW - - -	12,239	12,869	26,476	27,107	1,996	1,961
NAIRN - - -	6,246	6,471	19,360	19,396	690	670
ORKNEY - - -	28,428	28,661	36,836	37,539	2,586	2,637
PEEBLES - - -	7,498	7,391	201,538	195,852	618	643
PERTH - - -	75,728	78,665	746,865	741,152	7,594	7,325
RENFREW - - -	26,813	26,779	42,584	42,206	1,458	1,401
ROSS and CROMARTY - - -	43,965	44,986	326,144	323,000	4,790	5,001
ROXBURGH - - -	17,787	18,100	532,989	537,154	3,260	3,364
SELKIRK - - -	3,223	3,428	184,957	187,108	373	438
SHETLAND - - -	18,859	19,219	110,795	98,150	2,301	2,895
STIRLING - - -	33,902	34,923	122,584	128,663	2,096	2,242
SUTHERLAND - - -	12,051	12,719	208,540	207,075	815	880
WIGTOWN - - -	50,778	49,853	127,032	131,420	12,020	10,146

COUNTY SUMMARY.—ACREAGE OF POTATOES.

PRELIMINARY STATEMENT of the ACREAGE under POTATOES in the several COUNTIES of GREAT BRITAIN, compiled from the Returns collected on the 5th June, 1899, with a COMPARATIVE STATEMENT for 1898.

COUNTIES.	1899.	1898.	COUNTIES. (Continued).	1899.	1898.
	<i>Acres.</i>	<i>Acres.</i>		<i>Acres.</i>	<i>Acres.</i>
TOTAL FOR GREAT BRITAIN }	547,682	524,591	WALES.		
ENGLAND - - -	387,715	365,432	ANGLESEY - -	2,726	2,815
WALES - - -	32,982	32,797	BRECON - -	1,134	1,081
SCOTLAND - -	126,985	126,362	CARDIGAN - -	6,104	5,989
			CARMARTHEN -	3,797	3,713
			CARNARVON -	4,287	4,322
			DENBIGH - -	3,303	3,257
			FLINT - -	2,325	2,328
			GLAMORGAN -	1,983	1,948
			MERIONETH -	1,827	1,854
			MONTGOMERY -	2,059	2,077
			PEMBROKE - -	2,532	2,528
			RADNOR - -	905	885
ENGLAND.			SCOTLAND.		
BEDFORD - -	8,526	7,623	ABERDEEN - -	7,446	7,322
BERKS - - -	2,013	2,012	ARGYLL - -	4,576	4,759
BUCKINGHAM -	1,626	1,538	AYR - - -	7,818	7,297
CAMBRIDGE -	21,598	19,849	BANFF - - -	1,999	1,969
CHESTER - -	26,125	24,773	BERWICK - -	2,413	2,413
CORNWALL - -	5,649	5,337	BUTE - - -	959	961
CUMBERLAND -	9,232	9,080	CAITHNESS -	1,724	1,633
DERBY - - -	2,589	2,489	CLACKMANNAN -	317	327
DEVON - - -	12,536	12,547	DUMBARTON -	2,329	2,308
DORSET - - -	2,026	1,829	DUMFRIES - -	3,444	3,523
DURHAM - - -	8,883	8,621	EDINBURGH -	5,213	5,125
ESSEX - - -	10,272	9,981	ELGIN, or MORAY -	1,677	1,709
GLOUCESTER -	4,313	4,158	FIFE - - -	14,502	14,264
HANTS - - -	6,415	6,120	FORFAR - -	12,159	11,965
HEREFORD - -	2,087	1,909	HADDINGTON -	7,465	7,686
HERTFORD - -	4,159	3,921	INVERNESS -	5,946	5,927
HUNTINGDON -	8,471	7,872	KINCARDINE -	2,427	2,372
KENT - - -	13,772	13,276	KINKROSS - -	570	588
LANCASTER -	40,768	38,308	KIRKCUDBRIGHT -	1,452	1,481
LEICESTER - -	2,180	2,186	LANARK - -	4,117	4,163
LINCOLN - -	58,282	51,881	LINLITHGOW -	1,726	1,636
LONDON - - -	445	456	NAIRN - - -	317	324
MIDDLESEX - -	2,636	2,799	ORKNEY - - -	2,722	2,775
MONMOUTH - -	1,574	1,514	PEEBLES - -	371	369
NORFOLK - -	9,668	8,243	PERTH - - -	12,128	12,385
NORTHAMPTON -	3,172	3,102	RENFREW - -	2,964	2,946
NORTHUMBERLAND	4,646	4,499	ROSS and CROMARTY	7,559	7,523
NOTTS - - -	7,966	7,727	ROXBURGH - -	1,264	1,295
OXFORD - - -	2,587	2,495	SELKIRK - -	225	188
RUTLAND - -	170	150	SHETLAND - -	3,111	3,121
SALOP - - -	6,605	6,761	STIRLING - -	2,949	2,989
SOMERSET - -	5,415	5,034	SUTHERLAND -	1,671	1,677
STAFFORD - -	11,385	10,455	WIGTOWN - -	1,425	1,342
SUFFOLK - -	2,734	2,504			
SURREY - - -	6,053	6,021			
SUSSEX - - -	3,566	3,270			
WARWICK - -	6,365	5,973			
WESTMORLAND -	1,501	1,432			
WILTS - - -	2,976	2,782			
WORCESTER -	7,575	7,199			
YORK, E. RIDING	12,435	12,236			
„ N. RIDING -	12,139	11,790			
„ W. RIDING -	24,580	23,680			

IMPORTS OF THE CEREAL YEAR.

It has been the practice in this Journal to review at the close of the cereal year the chief features of the trade in imported agricultural products, and the statement on the next page, which has been prepared from the monthly accounts relating to trade and navigation, shows the quantities and value of the principal articles of this character imported into the United Kingdom in the cereal year ended August 31st last, and the imports of a similar kind in the corresponding twelve months of 1897-98. The changes exhibited by a comparison of the entries for the two periods of the more important items included in the statement may be noticed under the divisions of meat, grain, and dairy produce.

In the case of live meat it will be observed that there was a diminution of nearly 65,000 head in the number of cattle received in the past cereal year, compared with the entries for the preceding twelve months, this decline being represented by a reduction of £1,052,000 in the aggregate value of these imports since 1897-98. The falling-off was due for the most part to smaller consignments from the United States, whence 72,000 head fewer were received; the cargoes of cattle from Canada were also reduced by about 9,000 head, while Argentina, on the other hand, was credited with an augmentation of 16,000 head. The slight increase in the entries of sheep calls for no attention. It is noteworthy that there was an augmentation in the imports of all kinds of dead meat. In the case of fresh beef and mutton the aggregate consignments to our shores in the year just closed exceeded those of the previous year by 360,000 cwts. and 162,000 cwts. respectively. The larger receipts of the former article were due principally to heavier shipments from the United States, while in the case of fresh mutton, the increase is again accounted for by larger consignments from

Argentina, the total quantity credited to that source being 1,188,000 cwts., as compared with 1,023,000 cwts. in 1897-98 and 845,000 cwts. in 1896-97; the entries of Australasian mutton, on the other hand, slightly declined, amounting to 1,955,000 cwts. as against 1,980,000 cwts. in each of the two previous years.

ARTICLES.	1ST SEPT., 1897, to 31ST AUG., 1898.		1ST SEPT., 1898, to 31ST AUG., 1899.	
	Quantities.	Values.	Quantities.	Values.
Horses - - - No.	46,730	£ 1,226,571	40,781	£ 1,096,275
Cattle - - - "	590,873	9,882,362	526,104	8,829,889
Sheep - - - "	637,957	948,520	662,173	1,013,294
Bacon - - - cwts.	5,468,529	9,902,408	5,839,107	10,372,018
Hams - - - "	1,857,520	3,717,177	2,036,286	4,068,825
Beef :				
Salted - - - "	178,013	230,461	213,501	273,604
Fresh - - - "	3,162,070	6,098,844	3,522,220	6,681,731
Meat unenumerated				
Salted or fresh - "	415,287	823,687	441,225	845,748
Preserved, other- wise than by salting - - - "	543,144	1,600,043	614,698	1,832,843
Mutton, fresh - - "	3,286,542	4,910,719	3,449,213	5,346,298
Pork :				
Salted (not Hams) "	255,902	288,540	294,892	325,544
Fresh - - - "	449,251	960,763	671,853	1,386,939
Rabbits - - - "	267,712	528,250	329,244	583,325
Corn :				
Wheat - - - "	66,384,590	28,168,148	66,991,000	22,610,554
Wheat Meal and flour - - - "	19,969,580	11,405,364	22,923,473	11,014,829
Barley - - - "	20,257,729	5,427,815	22,869,458	6,343,603
Oats - - - "	15,384,190	4,263,264	14,869,370	4,113,996
Maize - - - "	55,641,692	10,751,513	57,500,000	11,899,112
Butter - - - "	3,200,843	15,883,636	3,353,724	16,753,004
Margarine - - - "	903,683	2,381,055	920,754	2,472,883
Cheese - - - "	2,421,937	5,259,791	2,486,684	5,437,882
Milk, con. or pres. - - - "	794,777	1,416,259	819,838	1,442,570
" and cream, fresh "	—	9,013	—	15,491
Eggs - - - gt. hundreds	13,789,128	4,276,740	15,667,457	4,847,115
Fruit :				
Apples - - - bushels	2,961,781	938,030	3,827,307	1,190,544
Pears - - - "	630,991	241,096	623,664	293,022
Hops - - - cwts.	228,978	825,474	225,996	1,064,820
Onions - - - bushels	5,816,590	758,665	6,709,074	829,918
Potatoes - - - cwts.	8,087,881	2,142,449	4,530,440	1,470,736
Tallow and				
Stearine - - - "	1,991,663	1,978,185	2,050,266	2,255,408
Wool - - - lbs.	691,910,328	23,438,876	663,572,417	22,843,553
Hides, wet and dry - - - cwts.	1,287,759	3,013,469	1,106,792	2,558,481
Lard - - - "	2,015,439	2,669,187	2,171,833	3,002,917
Poultry and Game - - - "	—	714,898	—	705,970
Vegetables (un- enumerated) -	—	1,493,267	—	1,810,568

The accounts indicate no interruption to the growth of our consumption of foreign bacon and hams, which has been steadily rising for some years. The United States was as usual responsible for the greater part of the increase of 550,000 cwts. in these imports, the total contributions from American ports in the past year having been 6,092,000 cwts. as compared with 5,657,000 cwts in 1897-98; Denmark sent 1,126,000 cwts. against 999,000 cwts. in the preceding twelve months; and Canada furnished 597,000 cwts., this quantity being slightly over her contribution of 1897-98.

With the exception of oats all kinds of grain were imported in larger quantities during the past cereal year than in 1897-98. The receipts of wheat and wheat meal and flour represented in wheat grain a gross importation of 23,060,000 imperial quarters of 480 lbs. as compared with 21,961,000 quarters in 1897-98 and 21,660,000 quarters in 1896-97. About two-thirds of the total quantity received at our ports in the past twelve months consisted of consignments from the United States amounting in all to 14,864,000 quarters, of which, roughly, two-fifths came in the form of flour. Of the remaining 8,196,000 quarters, India is credited with just under one-fourth; Argentina furnished 1,700,000 quarters, or nearly double her contribution of the previous year; Canada sent 2,293,000 quarters; and Russia accounted for 767,000 quarters, this being the smallest entry of Russian wheat recorded for many years. The last-named country was responsible for fifty per cent. of the importation of barley, of which we received from all sources 6,403,000 quarters, or 730,000 quarters more than last year. Attention has been directed on a former occasion to the considerable quantities of maize now consumed in this country, our annual import of this grain having exceeded fifty million cwts. in each of the past three years. For the greater part of this large supply we are indebted to the United States, whence we usually obtain about two-thirds, and sometimes a larger proportion, of the imports of maize. The gross quantity entered in the Trade Accounts of the past cereal year, viz., 57,500,000 cwts., was exceeded by the imports of 1896-97, when the entries amounted to 59,726,000 cwts. Our imports of oats were on a lower scale than in 1897-98,

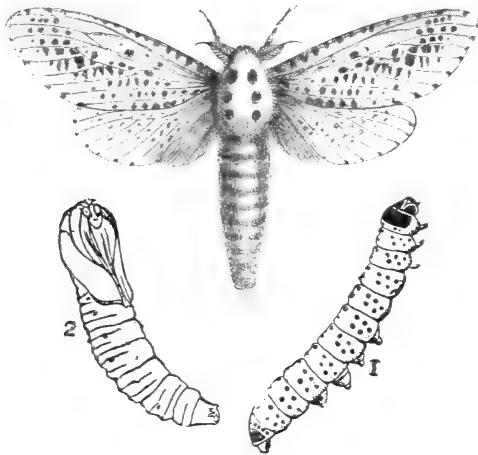
the quantity received last year being equivalent to 5,338,000 quarters as compared with 5,523,000 quarters and 6,599,000 quarters, respectively, in each of the two previous years.

Dairy produce of all kinds was imported in larger quantities in the twelve months ended August last than in the corresponding period of 1897-98. In butter the increase amounted to 153,000 cwts. Out of a total importation from all countries of nearly 3,354,000 cwts. Denmark is credited with 1,469,000 cwts., this quantity being slightly in excess of the receipts from the same source in 1897-98. The other principal contributors to our butter imports of the past year were France 370,000 cwts., Australasia 286,000 cwts., Holland 281,000 cwts., Sweden 270,000 cwts., and Canada 229,000 cwts. Canadian cheese constituted sixty per cent. of the total imports of this article in 1898-99, the shipments entered from the Dominion amounting to 1,476,000 cwts., while of the remaining 1,011,000 cwts. the United States is credited with 558,000 cwts., and the Netherlands with 321,000 cwts. The increase shown in the value of the imports of fresh milk and cream is due to larger consignments of cream having been received from Denmark, Norway, and Holland. The last-named country furnished as usual over ninety per cent. of the imports of margarine, which have remained about stationary for several years.

Among other agricultural imports in which an increase is recorded in the past cereal year as compared with 1897-98 are eggs, rabbits, apples, onions, and lard. The entries of the first-named article are the largest hitherto recorded, the quantity received last year representing a total importation of 1,880 million eggs, or 225 millions more than in the preceding year.

Articles showing a decrease include potatoes, wool, hides, and poultry and game.

THE WOOD LEOPARD MOTH (*Zeuzera Æsculi*).



Female Wood Leopard Moth ; 1. Caterpillar, 2. Chrysalis ; all natural size.

The Wood Leopard Moth is a large and beautiful moth, but, fortunately for fruit-growers, it is not very common ; though in the last and two or three previous seasons, there have been somewhat numerous complaints of injuries caused by its caterpillars to apple, pear, and plum trees. The caterpillars bore holes in the boughs and branches of the trees and feed upon both the soft and hard parts of the wood.

Pear trees are particularly liable to the attacks of the caterpillars of the *Zeuzera*, and large boughs are frequently found broken off, which show upon examination distinct traces of their borings. Apple trees are also often seriously injured by these insects, and plum trees, walnut trees, and sweet chestnut trees are occasionally attacked by them. The caterpillars are also sometimes found on the poplar, aspen, lime, sycamore, birch, willow, lilac, hawthorn, privet, holly, elm, and quince.

Though the moth is called *æsculi*, from the horse chestnut (*Æsculus hippocastanum*), it has not been found in England to specially attack horse chestnut trees. In Germany, too, it is called *Ross kastanien*—that is, of the horse chestnut; but Kollar remarks that it attacks this tree less frequently than many others. In France it is termed *Zeuzère du Marronnier*—*i.e.*, of the sweet or Spanish chestnut—though there it is also very troublesome to pear, apple, and walnut trees.

This moth and its caterpillar must not be confounded with the much larger Goat Moth (*Cossus ligniperdi*) and its huge caterpillar, whose attack upon fruit trees is precisely similar. It sometimes happens that fruit trees are quite killed by the attack of the *Zeuzera æsculi*, their trunks and branches being found full of holes and passages running in all directions. As many as seventy caterpillars have been taken from one apple tree, and there were signs that many more had escaped.

Life History.

The Wood Leopard Moth belongs to the family *Hepialidæ*, of the group *Bombycina*, and flies in the evening, resting inertly during the day-time. The female is larger than the male, sometimes even twice as large, being from $2\frac{1}{4}$ to $2\frac{3}{4}$ inches across the wings, which are light-coloured, almost white, with black or blue-black spots upon them placed here and there without regularity. The spots or markings on the light-coloured hind wings are not so dark-coloured. Upon the upper part of the body, between the wings, there are six blue-black spots in two rows on a whitish ground. The body underneath is dull white or grey, with bands of black. The head of the female is greyish white, and her antennæ are merely ordinary feelers without fringes, having tufts of scales at their bases. The male is less brilliant than the female, and has peculiar antennæ pectinated or toothed like a comb.

The female moth flies somewhat heavily and in the evening, resting in the day-time on the trunks of trees, on palings, and other exposed places. The moth appears in June and is seen from then until August. It is remarkable

that it is more frequently found in the metropolitan districts than in the country, and sometimes causes considerable destruction to the trees and shrubs in the public parks and private gardens of the metropolis.

Large quantities of eggs are laid by this moth. Curtis says that as many as 300 have been laid by one female. They are orange-coloured and oval, and are laid upon the stems and branches of trees. In a few days caterpillars come out and bore into the bark, where they remain feeding until the winter, when they bore deeper into the woody parts of the trees. They remain in larval state for two years, during which time they are feeding continuously. Pupation takes place in the month of May and the moths come out in June. The caterpillar is close upon two inches in length, with deeply divided segments. Its colour varies somewhat, according to the age of the larva, between yellowish white and yellow, with several black spots on each segment; the second segment is larger than the others and is covered with a wide dorsal plate of a dark-brown colour. Its head is rather small and blackish brown, and its mouth is furnished with strong jaws adapted for biting hard substances.

Pupation takes place close to the bark of the tree in which the larva has been feeding. The bark just over the hole or tunnel is left so thin by the larva that the pupa can force itself through it, and the empty case is found protruding from the hole after the escape of the moth. The pupa is nearly an inch long, brown in colour, and has rows of sharp spikes upon its back which serve to retain it in the mouth of the gallery during the escape of the moth.

Remedies and Methods of Prevention.

But little can be done to prevent the attack of this moth, or to check its progress. In the early stages it may be destroyed by poking stiff wire into the holes so as to pierce and kill it; but the caterpillar often takes a tortuous course and cannot always easily be reached by the wire. The hole may be discovered, although it is very small, by the collection of frass and excrement at the opening.

Syringing the holes with mixtures of unpleasant materials,

such as carbolic acid or other substance likely to kill or disturb the caterpillars, applied by means of sharp pointed syringes, has been tried, but without much avail, as the insects are generally found imbedded in frass which prevents the noxious materials from reaching them. Birds are very useful in destroying the moths and eating their eggs. Titmice are especially useful in clearing off the latter. The green woodpecker is also very serviceable in taking the caterpillars from infested trees, while the moth itself is an easy prey for many birds.

AGRICULTURAL EDUCATION IN FRANCE.

The information available concerning agricultural education in France has formed the subject of several official reports in this country, of which the more important are those by Mr Jenkins to the Royal Commission on Technical Instruction in 1882, by Major P. G. Craigie in 1888 and 1891, by M. Tisserand to the Royal Commission on Agriculture in 1893, and lastly by Mr. Austin Lee (*Foreign Office Report, Miscellaneous Series, No. 505, June 1899*).

Agricultural education, as it exists in France, may, apart from the instruction given in primary and normal schools, be divided into three grades, viz., elementary, secondary, and higher. From the official point of view, it may further be considered as consisting of two classes: National institutions, *i.e.*, supported wholly by the State, and institutions in receipt of subsidies from the State.

The direction of agricultural education in France is entrusted to a "Superior Council of Agricultural Education," composed of thirty members, of whom half are Government officials, and half are local notabilities (both agricultural and scientific), school teachers, and presidents of certain agricultural societies. It is charged with the general supervision of all the institutions affording agricultural instruction, and receives reports from the directors and professors. It usually meets only once a year and forwards a general report to the Minister of Agriculture; but it may be summoned at any time to meet and consider urgent matters.

This council was only created last year, by a decree of 27th May, 1898, and was the outcome of an official report, prepared by M. Méline when Minister of Agriculture. M. Méline's report lays stress more particularly upon the class of pupils attending the various institutions teaching agriculture.

While the provision made for education is apparently fully adequate to the requirements, it would seem that the results attained have not been entirely in the direction contemplated, and that but little advantage has been taken of the facilities offered by those for whom it is primarily intended. A disproportionately large number of pupils, it is stated, are exhibitioners, and go through the curriculum with the object of obtaining posts under the Government, rather than of returning to their own homes and applying the knowledge they have acquired to the improvement of their farms. One of the main objects of the new superior council is, therefore, to endeavour to so regulate the various schemes of agricultural education as to secure the attendance of a greater number of students from among the farming population, who will return to the land, and not merely form an addition to the candidates for Government employment.

Commencing with primary education, agricultural teaching of a more or less rudimentary character has, under a law of 1879, been made obligatory in the primary schools. In several "higher primary schools" a course of regular agricultural instruction has been introduced, while three are specially mentioned in the Year Book of the Minister of Agriculture as enjoying a complete agricultural course. In 1891 the number of those giving a direct agricultural course is given as 14. Small gardens are attached to many elementary rural schools, and the instruction in the schools themselves is stated to have produced most beneficial results.

The above law further provided for the appointment of "Departmental" professors in each department of the country, whose duties would be to lecture to farmers, conduct fields of "experiment" and "demonstration," and to teach during the winter in the normal schools. In 1882 the number of these professors was 55; in 1888 it was 87; in 1891 it was 90—*i.e.*, one for each Department (including Algeria). Indeed, the growth of the work of these professors has led to the creation of another class, called "special" professors who also lecture to country audiences, form part of the staff of superior primary schools, colleges, and lycées, and in general keep their pupils in touch with the progress, discoveries, and new

methods which have been attained. The difference in functions between the two classes of professors has been thus defined by M. Tisserand: "The task of the departmental professor is to teach the agricultural classes: that of the special professor to inform them." In 1894 the number of such special professors was given as 114, and there are now apparently about 160, including two at primary schools for girls.

Elementary, as distinct from primary, agricultural education is afforded by the Farm Schools and the Practical Schools.

Farm schools, where the sons mainly of peasants are to all intents and purposes apprenticed to the director of the school (who farms the land connected with it at his own risk), show a steady decline of late years. Mr. Jenkins reported 23 in existence in 1882, whereas there had previously been 40 or 50, and Mr. Austin Lee states that there were 75 in 1852. In 1888 the number had sunk to 18, in 1891 to 17, in 1893 to 16, and in 1899 to 14. There are, in addition to these farm schools, two sheep farm schools, one silk school, 14 cheese-making schools, and one school of fish-breeding.

In contradistinction to the decline of farm schools has been the rise in practical schools, which were designed to fill up for the benefit of the small farmer or peasant proprietor the gap between the primary or superior primary schools, and the National Institutions mentioned later on. In some instances no doubt they would bridge over for the pupil this interval between the one class of instruction and the other, but their chief object would seem to be—in the terms of the report of one of these schools, as quoted by Mr. Austin Lee—to take the child from the primary school, to give him two years' thorough practical and theoretical teaching, and then to send him back to the agricultural family, which he will not again leave. These schools take pupils from the age of about 13 to 18 and train them for one, two, or occasionally three years. Land, varying in extent from 7 acres at one school to 850 at another, is attached; generally, however, there are from 100 to 350 acres. The farming risks are all taken by the director, who is either the proprietor of the

land, or a tenant on a long lease, and all that the State does is to provide the salaries of the director and staff, together with a small sum for general expenses, and to give some £160 to £200 in scholarships to each school. The average cost of this to the State seems to be from £800 to £1,000 per annum for each school. The time of study is about evenly proportioned between class room instruction and practical work.

Both the farm schools and the practical schools are thus more or less private institutions subsidised by the State. These practical schools were instituted by a law of 1875, and up to the end of 1881 there were but six of them, although in 1882 three more were being organised. In 1888 they had risen to 18, and in 1891 to 30. In 1894 M. Tisserand mentioned, in all, 43, but divided them into ordinary practical schools numbering 24, and schools devoted to some special branch of agriculture (such as two for irrigation and drainage, seven for milking, four for vine culture, and one for poultry keeping) the total number of such special schools amounting to 19. In Mr. Austin Lee's report only 40 practical schools are mentioned, but these do not include some, at any rate, of the special schools given by M. Tisserand, for in the more recent report are mentioned (in addition to the 40 named above) two practical schools of poultry keeping, three cheese and butter schools, and one school of horticulture. It may be taken, then, that these schools are steadily on the increase, and that in time the hopes of those interested in them may be realised and that there will be one such school organised in each Department of the country.

In this connection may perhaps be most conveniently mentioned the agronomic stations and experimental fields scattered throughout the country. The agronomic stations and laboratories are, for the most part, departmental institutions subsidised, to a varying extent, by the State. Mr. Jenkins mentioned 23 agronomic stations in his report, mostly laboratories for analysis, but a few being stations of research. In 1888 they had doubled; in 1891 they had increased to 53; while M. Tisserand in 1894 mentions 30 agronomic stations, 30 laboratories for analysis, and 18 stations specially devoted to

the study of particular matters such as entomology, seed-testing, fish-breeding, wine manufacture, and so forth. M. Tisserand also reported as many as 3,362 "fields for experiments in all departments." Mr. Austin Lee gives the number of agricultural stations and laboratories as 59 in 1898, in addition to six of special types attached to the Institut Agronomique in Paris. While not giving the total number of the fields of "experiment" and of "demonstration," it appears from his report that these are in the proportion of about 1 to 4 or 5; and he states that "the first serve for experiments respecting the adaptability of different kinds of plants and crops to various soils, for the testing of chemical and other manures, etc.," while the demonstration fields are subsidiary to these, and the professors who look after them, using their knowledge of the general conditions which obtain in their several departments, "aim at producing the best possible crops, in order to convince the sceptical of the success of their methods by ocular demonstration."

Coming to the national institutions supported solely by the State, some embracing a general agricultural education in their curriculum, others of a purely technical character, a steady though not very extensive growth may be noted.

Three regional schools of agriculture exist, viz., Grignon (Seine-et-Oise), Montpellier, and Rennes, whose aims are "to raise the educational standard of the rural landed proprietors and farmers." One which was originally founded at Grandjouan is now carried on as a practical school, the national school at Rennes having been established to take its place. This last is in the centre of an important cider-making and grazing district, and special attention is paid to these two subjects. A school similar in character to the national schools, but established by private means, is the Institut Agricole at Beauvais, originally mentioned by Mr. Jenkins, and referred to in Mr. Austin Lee's report. It is carried on by a religious body, and is said to be the most important agricultural school, unconnected with the government, in France.

Among special government schools, the National School

of Horticulture at Versailles is still carried on on the lines indicated in Mr. Jenkins's report of 1882; and so, it would seem are the three national veterinary schools and the forestry school at Nancy, although they are only incidentally mentioned by Mr. Austin Lee. The National Dairy School at Mamirolle was not in existence in 1882, but has been mentioned by all those who have reported on the matter since then. Mention may also be made of the national school for shepherds at Rambouillet, although Mr. Austin Lee is inclined to classify this as a farm school, and probably (as he does not specify them) this is also the case with some of the local dairy schools mentioned in earlier reports. Institutions which have been established since the report of 1891 are:— a school of agricultural industries at Douai; a school of horse breeding at Le Piu, merely mentioned by M. Tisserand in 1894 without any particulars being given; and a colonial agricultural school at Tunis, opened in 1898, and designed to play the same part there that the national agricultural schools do in the mother country. The school at Douai was opened in 1893, and is designed to act as a technical school for instruction in matters relating to brewing, distilling, sugar manufacture, and also cheese-making. Its object is to train pupils as managers, and also to produce a class of educated foremen, capable of directing workmen and of executing the orders of chemists and engineers in an intelligent spirit.

The above regional and special schools may be taken to represent secondary agricultural education.

The highest stage of theoretical and scientific agricultural education in France is reached at the Institut National Agronomique, in Paris. The main object of the management seems to be that students should have the chance, on coming there, of giving their undivided attention for a few years to scientific study only, without the distractions of practical work, although this latter is by no means lost sight of, as students, on leaving, are required to spend at least two years at a well-organised farm.

The expenditure on agricultural education in France

amounts to about £150,000 annually. The Budget of 1899 contains a total vote for this subject of £152,460, almost equally divided between the national institutions and the institutions subsidised by the State. Against this may be set the sums received from fees and sale of produce, which in 1897 amounted to £12,680.

AGRICULTURAL AND MISCELLANEOUS NOTES.

ANALYSES OF DORSET SOILS.

Under an arrangement with the Dorset County Council, the Agricultural Department of Reading College has undertaken to analyse twenty specimens yearly of soils from Dorset. These are to be complete analyses, showing, in addition to their general composition, the amount of available plant food present. The districts from which the samples of soil are taken are carefully selected, so that the various geological formations in the county may be well represented, and also that each may be, as far as possible, typical of a considerable area of land. The principal object of the work is to place in the hands of the Dorset agriculturists information as to the composition of the soils of the county, and to give suggestions for the manuring of the different classes of soils.

The scheme came into operation in January 1898, and the Board have now received from Mr. D. A. Gilchrist, the Director of the Agricultural Department of Reading College, a copy of the first report on the analyses made last year.* It is intended that similar preliminary reports shall be published annually, and a full report issued at the end of the five years.

In this preliminary report, the number of soils analysed is naturally insufficient to justify any conclusions as to the connection between the chemical composition and the geological formation; and it has been found impossible to deal completely with the agricultural descriptions of the soils and of the districts from whence they have come in making suggestions for the manuring of the different districts.

* *First Annual Report on the Soils of Dorset*: Supplement VIII. to the *Journal of Reading College*, August, 1899. Price 1s.

These points will remain to be fully dealt with in the final report. Moreover, several interesting and important points in connection with the Dorset soils have presented themselves during the past year, which will receive further attention in the subsequent course of the investigation.

The present report consequently, in addition to explanatory matter as to the methods of taking the samples and of analysing them, treats the fields individually. Some comparative tables, showing the percentages of the principal plant-foods (nitrogen, phosphates, and potash) found in the different fields have, however, been drawn up, and serve to give a general idea of the amounts of these substances met with up to the present.

The report is drawn up from two different points of view. The first part by Mr. C. M. Luxmoore, entitled "The Soils in the Laboratory," contains the results of the analyses, with remarks thereon; while the second portion is drawn up by Mr. Gilchrist, and contains the discussion on "The Soils in the Field," with suggestions for manuring.

The general method of taking a sample is as follows:—A suitable district, where there is a considerable amount of land of the same character, is chosen; local information as to the agricultural and other characteristics of the soils is collected from the farmers of the district. In each case three boxes of soil and subsoil are taken from a field which is of well-marked geological character and is throughout of somewhat the same nature. Usually these three samples are taken from points in a diagonal line, so that one is from the middle and the other from two corners or ends of the field. The boxes are made of wood, six inches by six inches by eighteen inches inside measurement, and each contains a section of the soil and subsoil to a depth of eighteen inches. The method is to dig round a block of soil, over which the box is inverted and driven downwards as digging proceeds. It is found that the line between soil and subsoil is usually well marked.

On reaching the laboratory, the contents of the boxes are divided into soil and subsoil. As a rule, this is done at a depth of nine inches, but sometimes six inches appears to coincide

better with the natural line of demarcation; in such cases the soil is taken to this depth, and the next three inches separately dealt with. If the three boxes from a field present a similar appearance, as is generally the case, a mixture of fine earth from each sample is made, and is taken to represent the fine earth to the given depth of nine or six inches. The stones and gravel—*i.e.*, such as do not pass through an eighth-of-an-inch sieve—are separated, and the remaining fine earth is taken for analysis.

The actual number of analyses reported on is 26—viz., 22 from Dorset, and four soils from lands where experiments are being carried out under the direction of the Reading College, in the counties of Oxford, Berks, and Hants.

The amounts of nitrogen found in these 26 soils ranged between 0.09 and 0.47 per cent. of the soil (including stony matter); whereas, in the subsoil—the lower nine inches—the percentage varied from 0.05 to 0.15. The phosphates, calculated as the percentage of phosphate of lime in the soil, ranged from 1.07 to 0.27 per cent. Assuming that an acre of soil nine inches deep weighs 1,100 tons, these results would represent an equivalent of from three to twelve tons of phosphate of lime to the acre. These figures apply, however, to the total phosphates, and of phosphates easily soluble the range is between 0.01 and 0.07 per cent. only, equivalent to about $2\frac{1}{2}$ to 15 cwts. per acre of phosphate of lime soluble in dilute acid. Potash was found to range from 0.12 per cent. (equivalent to less than two tons of potash per acre) to 0.49 per cent. (over 5 tons to the acre).

MANURING OF PASTURES.

During the past five years experiments on the manuring of pasture have been made under the supervision of the Agricultural Department, Reading College, at eighteen centres in the counties of Berks, Dorset, Hants and Oxford.

The results of these experiments have shown conclusively that phosphatic manures are most generally useful for improving pasture, both in bulk and (especially) in quality. On the whole, basic slag proved to be the most economical

and effective phosphatic manure for this purpose, having given good results for five years after its application.

A potash manure, such as kainit or sulphate of potash, was found to be useful on the lighter soils, notably on the chalk downs, where it greatly improved the quality of the herbage and developed leguminous plants; on the heavier soils, however, potash manures were, as a rule, not effective, although there have been indications in the past two years that, even on some heavy soils, good results are given by these manures. On the lighter soils, and especially on chalk and calcareous soils, superphosphate proved to be quicker in its action, and probably more economical, than basic slag.

Nitrogenous manures, such as nitrate of soda and sulphate of ammonia, generally increased the bulk considerably in the first year, but made the pasture coarser. After the first year the pasture was invariably coarser where nitrate of soda had been applied, whether the plot was grazed or mown, and the conclusion arrived at was that even one dressing of nitrate of soda applied to a pasture will, in after years, have a bad effect; this has been found to be the case in these experiments whether the nitrate of soda was applied by itself or in combination with other manures. A striking general result also is that where plots were mown for hay, nitrate of soda in combination with other manures generally increased the crop of hay in the first year, but in many cases there was no such increase when the application of this manure was continued for a second and later years, while the quality of the herbage and of the hay made from it was invariably better where phosphatic and potash manures only had been applied than where these manures were accompanied with nitrate of soda.

Common salt was applied to pasture at several centres and gave almost invariably a negative result, so that, so far as these experiments go, this substance could not be recommended as an application for pasture land; there is no evidence to show that it makes pasture finer, as is popularly supposed.

Lime was applied at several centres, but only in a few cases with good results; at no centre did it give a profitable

return; in most cases basic slag gave—at much less cost—the results generally attributed to lime.

Farmyard manure yielded the best results on thin soils, like that of the chalk down-land at Lockinge, near Wantage; it evidently supplies the organic matter which it is so necessary to accumulate on the surface of such a soil before it makes a good pasture. This manure also proved useful at the other centres, but not so economical as a judicious application of artificial manures. When farmyard manure is applied to a pasture, it is probably advisable to accompany it with a dressing of phosphate manure (and potash manure, if necessary), as thereby the tendency of the farmyard manure to produce a somewhat coarse herbage will be to a large extent counteracted.

It appears from the results of these experiments that phosphatic and potash manures are best applied to hay or pasture land in the previous autumn or early winter, and that it is highly advantageous to thoroughly harrow the soil at the time of the application of these manures, especially where the herbage is rather rough. This harrowing enables the manures to become effective more quickly, and at the same time promotes the growth of finer herbage by removing the coarse fogg, which is apt to accumulate on the surface of most pastures.

THE ECONOMIC FATTENING OF CATTLE.

An experiment has been carried out on the farm of the University College of North Wales, Bangor, to determine the amount of concentrated food necessary for fattening cattle for the butcher, with the object of making a profit. For this purpose two lots of Welsh bullocks, four in each lot, two and a half years old, similar in appearance and character, were selected. Two from each lot had been grazed on the farm during the summer, and the remaining four were purchased from a farm in Denbighshire a few weeks before the experiment commenced. They were all running out at grass until the end of October, when they were put into boxes and fed

with equal quantities of the same food until November 29th, 1898, when the experiment commenced.

The animals in both lots were given as much chaffed hay and straw and pulped roots as they would eat, together with 5 lbs. of long hay per head daily. In addition to this common ration, each bullock in Lot I. received per day 3 lbs. of maize meal and 3 lbs. of decorticated cotton cake, while for Lot II. an individual daily allowance of 5 lbs. of each of these foods was provided, so that the total daily supply of concentrated foods was 6 lbs. per head for Lot I., as compared with 10 lbs. for Lot II. It was noticed that the animals which received the smaller rations of cake and meal ate a little more long hay (about 1 lb. per head per day) than those of the second lot. Water was supplied twice a day; no difference was observed in the quantity drunk. It was intended at the outset to increase the allowance of cake and meal to Lot I. to 4 lbs. of each food, and at the same time to give 6 lbs. of cotton cake and 6 lbs. of maize meal to Lot II. This was actually done for two days at the end of December, but was then discontinued as it was found that the cattle in Lot II. did not eat the extra quantity.

Before the commencement of the experiment the cattle were all weighed. They were again weighed at the end of a month, and again before they left to be slaughtered at the end of nine weeks. They were sold and slaughtered in two successive weeks, two being taken from each lot on both occasions.

The aggregate live weight of the four bullocks in Lot I. at the beginning of the experiment was 39 cwt. 2 qrs. 26 lbs., and at the close it was 44 cwts. 0 qrs. 26 lbs.; the total increase was therefore $4\frac{1}{2}$ cwts., or an average of 126 lbs. per head. Lot II. started with an aggregate weight on hoof of 40 cwts. 1 qr. 14 lbs., and they put on altogether in the nine weeks 3 cwts. 3 qrs. 12 lbs., or an average increase of 108 lbs. per bullock.

The total carcase weight of Lot I. when slaughtered was 23 cwts. 2 qrs. 8 lbs., or 5 cwts. 3 qrs. 16 lbs. per bullock; while on Lot II. it was 24 cwts. 2 qrs. 20 lbs., or 6 cwts. 0 qrs. 19 lbs. per head. The average percentage of dead to live weight in each lot was 53.2 and 55.7 respectively.

As the quantities of hay, straw, and roots given to each lot were practically identical, only the cost of the cake and meal need be taken into account in determining the economic value of the two concentrated rations. And the total cost of the concentrated foods consumed amounted to £4 8s. 2d., or 22s. 0½d. per head for Lot I., and £7 13s. 6d. or 38s. 4½d. per bullock for Lot II.

It appears therefore from the results of this experiment, that notwithstanding that the cotton cake and maize meal supplied to the four bullocks in the second lot cost £3 5s. 4d. more than that supplied to the first lot, there was an aggregate gain in live weight in the latter over the former of 72 lbs. which at 32s. per cwt. amounts to £1 0s. 6d. or 5s. 1d. per head, and adding the extra cost of the cake and meal supplied to Lot II., viz., 16s. 2d. per head, the gain in favour of Lot I. amounts to 21s. 3d. per bullock. But from this must be deducted 1s. 6d. per head, the value of the extra long hay consumed on the average by every bullock in Lot I., which leaves a net gain per head in favour of Lot I., of 19s. 9d. The extra value of the manure from Lot II., which would partly reduce the balance against this lot, was not calculated.

On the other hand, to judge from the carcase weights the results are much more favourable to the heavier feeding, as the percentage of carcase to live weight in the case of Lot II. was higher throughout by 2½ per cent., or on the average by about 31 lbs. carcase weight per head, which at 6¼d. per lb. (the price at which the cattle were sold) amounts to 16s. 2d., and exactly balances the extra cost of cake and meal. But the bullocks in Lot I. gained on the average 18 lbs. more in live weight than those in Lot II., and on the assumption that 60.0 per cent. of this increase was carcase (a low estimate), there would be a gain of carcase weight of 10½ lbs. per head in favour of Lot I., which at 6¼d. a lb. would amount to 5s. 7d. per head. After deducting 1s. 6d. per head for the extra long hay the net gain in favour of Lot I. would then be 4s. 1d. per head. It is held, therefore, that although when judged from the standpoint of carcase weight the gain in favour of Lot I. is reduced, it still remains, and

that the experiment, so far as it goes, indicates that the ration of 6 lbs. per head of cake and meal was more profitable than one of 10 lbs.

THE FIRMNESS OF BACON.

The Report of the Agricultural College of Ontario, for the year 1898, contains an account of some experiments undertaken with swine to determine the effect of food and exercise upon the quality of the meat produced from the animals, particularly with regard to its suitability for bacon. It appears that there have been complaints that Canadian bacon is occasionally soft: and one object of the experiments was to discover how far this characteristic is affected by certain methods of feeding and handling the pigs.

It is explained that "soft" bacon is not "fat" bacon, and that recent observations indicate that softness is more likely to develop in hogs that are too lean than in those that are too fat. The softness develops while the bacon is in the salt, and when taken out of the salt the fat is soft and spongy, the value of the bacon being reduced according to the degree of softness.

Three different classes of animals were chosen for these experiments, and they were divided into three groups.

The first group consisted of twelve hogs which had been running on the stubble-fields for six weeks. The animals, which were well-grown and fleshy, each weighing about 110 lbs., were divided for experimental purposes into three lots, and fed on the following rations for six weeks before slaughtering:—Lot 1, rape and maize meal, the meal ration being two-thirds of that fed to the other animals of this group; Lot 2, a full ration of maize meal; and Lot 3, a full ration of equal parts, by weight, of peas, barley, and shorts.

The second group comprised eleven hogs, which were purchased when about six weeks old, and were kept in pens until they were slaughtered. They were fed on wheat middlings, and wheat middlings with shorts mixed with skim milk, until they weighed between ninety and one hundred

pounds. They were then divided into three lots, and fed for six weeks as follows:—Lot 1, rape with a mixture of equal parts, by weight, of peas, barley, and shorts, the maize ration being two-thirds of that fed to Lot 2, which received maize-meal alone, and Lot 3, peas, barley, and shorts.

The third group included twelve pure-bred hogs of six different breeds, each of which was represented by two animals, which were purchased when from seven to nine weeks old. This group was also divided into three lots as follows:—The hogs in Lot 1 were kept in pens with small outside yards, two hogs in each pen. From June 14th to August 19th they were fed with wheat-middlings mixed with water. From the 19th August to the 12th September they were fed with equal parts, by weight, of wheat, shorts, and barley, with water. From the 12th September to the 24th October (the close of the experiment) they were fed with equal parts, by weight, of peas, barley, and shorts, with water. The hogs in Lot 2 were given exactly the same treatment and the same meal ration as those in Lot 1, but were fed with whey in addition—about two pounds of whey to one of meal. The hogs in Lot 3 had the run of a half-acre plot, which furnished some grass until about the middle of August. They received exactly the same ration as Lot 1. Thus, Lots 1 and 2 were kept under the same conditions, but received different rations; while Lots 1 and 3 received the same rations, but were kept under different conditions.

At the close of the experiments all the hogs were slaughtered, and the different lots were kept separate when in the salt. When they were taken out of the salt, the firmness of the bacon was carefully noted, and the results of the examination furnish some interesting points. As regards the first group, all the pigs fed on rape and maize meal, and on maize meal alone, produced firm bacon, while tenderness was developed only in the lot fed on peas, barley, and shorts. It is scarcely probable that this tenderness was due to the food, since only one hog was tender while the other three were remarkably firm. It must not be assumed that maize will not produce soft bacon, for it must be borne in mind that the hogs in this group were strong and fleshy

before the maize-feeding commenced, and that they had had an abundance of exercise up to the commencement of the experiment. It is fairly safe to assume, however, that neither maize nor rape will injure hogs that have been reared in this manner; but the influence of maize on very young animals is not shown in this experiment.

All the hogs of the second group received the same treatment previous to the commencement of the experiment. Tenderness was evinced in Lot 1 only, which received peas, barley, and shorts with rape. It would seem logical to attribute the tenderness to the rape, but an objection to this conclusion is encountered on reference to Lot 1 of the first group, where rape produced no injurious effect. Possibly the hogs in this lot, having had no exercise like those in the first group, were more susceptible to injury from rape feeding. Six weeks of maize feeding produced no bad results in this group.

Some very striking observations were made regarding the animals in group 3, for whilst the condition of the first lot was very bad, it was very satisfactory in the second lot. The only difference in the treatment of these two lots consisted in feeding whey to Lot 2 along with the meal, and giving Lot 1 water and meal only. The difference in firmness was so striking that it seems conclusive that whey tends to produce firm bacon. Again, whilst the pigs of Lot 3 of this group were not in satisfactory condition, they were decidedly superior to those of Lot 1 in point of firmness. The same rations were fed to these two lots of animals, but the third had access to half an acre of ground whilst small yards only were attached to the pens of Lot 1. The outdoor feeding, therefore, proved more satisfactory than the inside feeding when the ration was the same. In spite of lack of exercise, however the animals which received whey were the best of the group.

The results of these experiments are summarised as follows:—Maize apparently produces no evil effects upon the firmness of bacon when used for finishing hogs that have plenty of exercise until they reach about 100 pounds live weight. Neither does maize appear to have any bad effects when used for finishing hogs that have had no exercise, but

have been fed with skim milk and a mixed grain ration until they reach 100 pounds live weight. What has been said of maize may also apply to rape, when fed with a two-thirds meal ration, though the evidence is somewhat conflicting on this point. Hogs confined in pens and fed on wheat middlings during the early stages of growth, and on peas, barley and shorts during the finishing period, have a marked tendency to softness. Hogs having plenty of exercise, and fed as just described, produce firmer bacon than those confined in pens. The evil effects arising from lack of exercise can be overcome by the judicious use of skim milk and whey. The amount of whey recommended is from two to two and one-half pounds of whey to a pound of meal. Whey and skim milk appear to have a greater influence than exercise in producing firm bacon. Unthrifty hogs are more likely to produce soft bacon than thrifty, well-fed hogs.

These results are not to be taken to represent definite conclusions, inasmuch as the investigation in question is merely in its initial stage. They are, however, stated to be results which might reasonably be expected.

CONDITIONS AFFECTING THE MILK YIELD OF COWS.

The report on the results of Mr. Lloyd's investigations into Cheddar cheese making, to which reference is made elsewhere in this journal,* contains some interesting remarks on the conditions affecting the milk yield of cows. These inquiries were carried out at the cheese schools of the Bath and West and Southern Counties Society, which have been located during the past eight years on seven farms in different parts of the county of Somerset, and the following notes are based on the records kept of the dairy herds on these farms.

From the observations made at these farms in the eight years over which these investigations extended it would appear that the quantity of milk yielded by cows depends mainly upon succulent food, and that where the conditions are favourable

to the production of abundant grass, be those conditions local or seasonal, the maximum milk yield is usually obtained.

The quality of milk appears, however, to depend upon far more numerous factors. The cattle themselves, and the nutriment in their food, are regarded as the primary causes of fluctuation; but the nutriment in the food depends not only upon the character of the soil but also upon climatic conditions. Moreover, the milk will vary in quality not only in a general way, by at times containing more solid matters than at other times, but there is distinct evidence that the constituents of these solids also vary according to the food of the cows.

During the whole period covered by the investigations referred to above, the volume of morning's milk was always greater than that of the evening's. The maximum variation being in the month of October, the smallest in the month of July. The volume of the morning's milk in April was one-fifth more than that of the evening's; in May it was one-sixth, in June one-eighth, in July one-twentieth, in August one-eighth, in September one-fifth, and in October one-fourth. Hence the excess was greatest in October, and next in April and September.

In explanation of these facts it is pointed out that in July the work of harvest keeps the farm hands busy until late in the evening, and the evening's milk is brought into the dairy later in that month than during any other part of the year. Thus the time which elapses between two milkings is more equal than during any other month. On the other hand, in October, the dark mornings make the milking later than usual, while the drawing in of the day causes the milking to be done earlier in the evening, so that the time which elapses between the two milkings is most uneven. It would appear, therefore, that the morning's milk is more than the evening's mainly owing to the longer time which has elapsed since the last milking; in other words, the animal has had longer time in which to produce the milk.

With regard to the influence of the period of calving, it appears from the results of these observations that cows

which calve in the month of March and April come to the flush of their milk yield about one month or six weeks after calving, and maintain this flush for about four to six weeks. After this period there is a decline in the quantity of milk yielded. Taking the highest average daily yield (146 gallons in June) as the maximum from which the decline commences, the falling off during July amounts to 19 gallons ; in August, as compared with June, to 33 gallons ; in September to 51 ; and in October to 76 gallons : or approximately by an eighth of the maximum yield in each month.

From the data at his disposal Mr. Lloyd has attempted to estimate the annual milk yield of Somerset cows. As his observations were carried on each year for only seven months of the milking period, it is not possible to state with certainty what was the actual yield of the cows at each farm where the cheese school was located, but records were kept of the total monthly yield for seven months, and the yield during the remaining three months was estimated. The results obtained in this way are as follows :—

Year.	Average No. of Cows.	Actual Yield per Cow, 7 months.	Estimated Yield per Cow, 10 months.
	No.	Gallons.	Gallons.
1891 - - -	48	426	473
1892 - - -	47	443	501
1893 - - -	52	492	550
1894 - - -	49	511	568
1895 - - -	64	461	503
1896 - - -	57	464	500
1897 - - -	46	474	564
1898 - - -	44	453	507

If, as these results would appear to indicate, the average yield of milk per cow is only about 500 gallons, it is evident, Mr. Lloyd points out, that considerable improvement is not only possible, but highly desirable, and could probably be brought about at no very great expense by greater care in breeding.

In connection with the foregoing observations on the influence of the period of lactation on the volume of milk yielded by cows, reference may be made to some notes on these points published by the Cornell University

Agricultural Experiment Station in New York in a recent bulletin. Records have been kept of the milk yields obtained from the University herd during the seven years 1891-98. This herd, which consists of about twenty cows, mostly Jerseys and Holsteins, has been developed from the ordinary stock of the neighbourhood by the use of thoroughbred bulls and a rigid selection of the best heifers. This course of breeding was established in 1875 and has been continued ever since; and the successful results of the care bestowed on their selection may be judged from the fact that in 1875 the average yield of milk per cow was little more than 300 gallons, whilst the descendants of these same cows produced an average of 750 gallons in 1897-98.

The cows are bred, so far as possible, to calve during the early autumn, and they are milked for about ten months, most of them being dry during July and August. In summer they are kept at pasture, which is supplemented when necessary with green forage; in winter they are stabled, but have access during the day to a covered yard. The average milk production of the cows for each year is given in the following table:—

Year.	Number of Cows.	Age.	Gallons of milk per Cow.	Average percentage of fat.
1891-2 - - -	19	4'0	716'34	3'94
1892-3 - - -	17	4'6	687'50	3'93
1893-4 - - -	19	4'5	756'33	3'86
1894-5 - - -	22	4'8	716'29	3'77
1895-6 - - -	19	4'2	745'62	3'57
1896-7 - - -	20	4'2	749'54	3'62
1897-8 - - -	19	4'7	757'53	3'68

An examination of the records of all the 135 cows made for the purpose of determining the average rate of decrease in yield of milk as the period of lactation advances, and also the average increase in the percentage of fat during the same time, shows a gradual and fairly regular decrease in milk flow from the time of calving until the cow is dry. With regard to the percentage of fat, the records show a decrease from the first month to the second, and then a gradual rise

to the end of the milking period; but at no time does the increased percentage of fat compensate for the loss in yield of milk. In other words, a cow may generally be depended upon to give a larger yield of butter-fat during the first weeks of a milking period than at any subsequent time during the same lactation. The following statement shows the ratio of variation in yield of milk and percentage of fat in periods of four weeks each. The first two weeks after calving were omitted from the calculations because so many abnormal conditions affect the flow of milk at that time. The average for the first period of four weeks (commencing from the third week after calving) is shown as 100, the increase or decrease from that number representing the variation in the succeeding periods.

Average for 135 Cows.	No. of Periods of four weeks, each after calving.										
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th
Milk - - - -	100	96	93	89	85	81	76	71	67	62	55
Fat - - - -	100	96	96	97	98	98	102	103	104	104	106

The above table includes 135 yearly records, and it is thought that such a large number must give a fair representation of the average decrease in yield of milk and increase of percentage of fat as the period of lactation advances. The average decrease in yield of milk as lactation advanced was about five per cent. from each period of four weeks to the next. In percentage of fat there was an average increase of about one-half per cent. from month to month.

SKIMMING MILK FOR BUTTER.

Some experiments have been carried out at the Munster Dairy Institute for the purpose of testing certain recommendations in regard to the skimming of milk, which were contained in a circular on butter-making issued by the Institute. This circular advised that cream should be skimmed off at the end of 12 hours, again skimmed at the end of another 12 hours, and finally skimmed after a third period of 12 hours had elapsed, or three times in 36 hours, special care

being taken not to remove any skim-milk in taking off the last layer of cream. Doubt having been expressed as to the advisability of this system as compared with skimming once only at the end of 24, 36, or 48 hours, it was decided to make some comparative tests. Nine separate trials were made between March and August, for each of which five gallons of milk were set, and skimmed at various intervals. One lot, following the recommendation in the circular, was skimmed after standing 12 hours, again after a further 12 hours, and finally after a third interval of 12 hours. The other three lots were skimmed only once, at intervals of 24, 36, and 48 hours respectively. The yield of butter obtained from the cream skimmed at the different intervals was compared both as to quantity and quality, and as a result of the nine trials it appears that the cream which was skimmed at three short intervals produced in the aggregate 16 lbs. 2½ ozs. of butter, against 15 lbs. 11 ozs. from that skimmed only once after standing 24 hours, and 15 lbs. 4½ ozs. from that obtained from the milk which stood from 36 to 48 hours before being skimmed. As regards quality, the judge reported that in every case, except one, the butter made from the cream obtained by three skimmings at three short intervals was best, both as regards flavour and keeping quality.

SPRING AND SUMMER HIRINGS IN SCOTLAND.

Reports have been received by the Labour Department of the Board of Trade from a correspondent in Scotland, based on information obtained from hiring fairs, and also from a number of representative employers, of the rates of wages obtained by farm servants at the principal Scotch hiring fairs which took place between the months of February and June. From a summary of these reports, published in the *Labour Gazette* for August, it appears that, generally speaking, the rates of wages for men at the spring hiring fairs in the border counties and the Lothians, and at the summer hiring fairs in other parts of Scotland were well maintained, compared with

the corresponding period in 1898, and in some districts slight increases took place. Women workers and domestic servants were, however, scarce, as has been the case for some years, and their wages accordingly showed an upward tendency.

At the annual spring hiring fairs in the border counties and in the Lothians, ploughmen obtained between 15s. and 18s. a week with cottages free, allowances of meal and potatoes, and coals carted free, and frequently food and drink during harvest. Sometimes milk was also given, and straw for pigs. In some cases higher wages were given, and fewer perquisites. Women workers in the border counties got from 8s. to 10s. a week, with 20s. to 30s. extra at harvest, and in the Lothians about the same weekly wages, and from 3s. to 5s. extra per week during potato lifting and grain harvest.

In other parts of Scotland, at the half-yearly hirings, first horsemen as a rule got from £14 to £17 for the half-year, and in some cases up to £18 or £19, with the usual perquisites; other horsemen got from £10 to £14, with the usual perquisites; and cattlemen from £10 to £19 for the half-year, with perquisites.

In some of the Forfarshire fairs a rise of wages took place, specially good men getting advances of from 10s. to 40s. for the half-year. In some of the numerous fairs in Aberdeenshire, and also in the County of Banff, slight increases were reported. As a rule, in the counties north of the Spey there were generally very few changes in wages. In some instances usually in the case of men changing their places, there were slight advances, and in a very few cases, notably at Elgin, small reductions from the rates paid twelve months ago.

AGRICULTURAL WAGES IN JUNE, 1899.

The *Labour Gazette* for July, 1899, contains information received by the Board of Trade from a number of correspondents in England as to the rates of weekly cash wages paid to ordinary agricultural labourers in June, 1899, as compared

with the same month of 1898, excluding piece-work earnings and extra allowances of all kinds.

The general effect of these returns is to show that there has been an upward movement in agricultural wages. The particulars obtained refer to 149 poor law unions in the mid-land, eastern, home, southern, and south-western counties; the number of agricultural labourers in these unions, according to the census of 1891, being 248,173. Of this number it appears that 62,064 were in unions where wages were 1s. a week more than in June, 1898; 10,559 in unions where wages were 1s. 6d. a week more; and 2,934 in unions where wages were 2s. a week more; the remaining 172,616 labourers being in unions where there was no change. The average rise, spread over the whole number of labourers included in the returns, was about 4d. a week per head.

The greatest number of changes took place in the corn-growing counties, comprising Cambridge, Essex, Lincoln, Norfolk, and Suffolk. Out of the total of 75,557 agricultural labourers in unions reported on in which wages were changed 28,540 (or 38 per cent.) were in the eastern counties, forming nearly 29 per cent. of all the labourers covered by the returns received from those counties. A larger proportion of the labourers in the home counties, however, were in unions in which a rise of wages was recorded; 17,808 out of the 30,818 in these counties, or nearly 58 per cent., being in the unions where wages were higher.

The northern counties have been excluded from these calculations, as the greater number of labourers are there hired by the year or half-year. Wages in these counties in 1899 have been well maintained, and at some of the hiring fairs there has been an upward tendency. At these fairs it was reported that men farm servants, particularly the more experienced, were generally scarce; further, that women for farmhouse work were almost impossible to obtain, and that a good deal of dairy and house work would consequently have to be done by the farmers' families.

The rates of wages generally obtained for the half-year in Cumberland, Westmorland, and Lancashire were as follows (board and lodging in addition): Best men £16 to £18 10s.

and up to £20 at Kendal and Ulverston; second men and youths £10 to £17; boys, £5 to £10; best women £12 to £14; second women £9 to £11 10s.; girls £5 to £8.

AGRICULTURE IN ALGERIA.

In the report to the Foreign Office on the trade of Algeria during the year 1897-8 Mr. Hay-Newton, Her Majesty's Consul-General at Algiers, gives the following information regarding the agriculture of this French colony.

The agricultural population at the end of December, 1897 amounted to 3,644,614 persons, of whom 207,310 were Europeans, and 3,437,304 were natives. According to other statistics the total amount of stock possessed by both Europeans and natives during the year 1898 amounted to 12,454,034 animals, consisting of 202,343 horses, 142,796 mules, 255,870 asses, 205,287 camels, 1,004,175 cattle, 7,026,290 sheep, 3,526,508 goats, and 90,765 pigs. Compared with the previous year there was a decrease of 38,000 animals, including 690,000 sheep, 91,000 cattle, and 41,000 goats. The following table gives the figures of the cereal harvest of the year 1898:—

Crop.	Area.	Quantity Produced.
	Acres.	Bushels.
Wheat soft - - - -	577,600	5,861,500
„ hard - - - -	2,528,700	21,196,000
Rye - - - -	760	9,230
Barley - - - -	3,073,200	39,725,000
Oats - - - -	176,300	4,932,500
Indian corn - - - -	31,440	323,070
Total -	6,388,000	72,047,300

There is a considerable export trade in cattle and sheep from the port of Oran. A trial shipment of sheep to a Channel port was made in 1897, but it has not been repeated, the sea voyage comparing very unfavourably with that to Marseilles. The shipment of horses to Gibraltar still continues, although not on a very large scale.

Some 12 or 15 years ago almost all the vegetables con-

sumed in Oran were imported from Spain, and a large fleet of small vessels (feluccas) was engaged in the trade. When the phylloxera was raging so badly in the south of Spain a law was passed forbidding the importation from that country of any fruit or vegetables into Algeria. This measure was taken ostensibly to protect the Algerian vineyards from the scourge, although the phylloxera had been officially recognised as already existing in Algiers. At all events, the Government prohibited the trade, and for some two years all fruit and vegetables rose to an exorbitant price, which stimulated the colonists, and more particularly those in the neighbourhood of towns, to dig wells and search for water, many finding it where it had hitherto been considered impossible. The result is that vegetables are now as cheap as in Spain itself, and although the interdiction referred to above was raised some six years ago, the trade has never revived, and the province is now able to export a large quantity of early vegetables and fruit, which, in 1898, amounted to 1,905 tons of vegetables, 1,538 tons of fruit, and 788 tons of potatoes.

[*Foreign Office Report, Annual Series, No. 2,302.*]

THE PRODUCTION OF MUTTON IN THE UNITED STATES.

The number of sheep estimated to exist in the United States on the 1st January in each of the five years 1891 to 1895 inclusive amounts to a yearly average of 44,449,000 head, while the average annual sheep stock for the period 1896 to 1899 inclusive works out to only 37,972,000 head. But notwithstanding the apparent diminution in the flocks of the country, sheep rearing is held to have made substantial progress, and according to a bulletin issued by the Department of Agriculture at Washington the production of mutton for American and European markets is rapidly becoming an industry of considerable proportions. In connection with this statement, however, it may be observed that the flocks of the United States have, as yet, barely produced sufficient meat to satisfy the home demand, for although the exports of sheep from American ports have in some

recent years exceeded 400,000 head, they have been, on the whole, more than balanced by the imports of fat sheep, mainly from Canada. Still, the low prices which have prevailed for maize in the past few years have induced American farmers to turn their attention more and more to the conversion of this grain into mutton, and the authorities of many of the State experiment stations have encouraged this movement by demonstrating experimentally that profitable returns can be secured by the utilisation of maize and other surplus grains in the raising of sheep.

The great breeding ground for sheep in the United States is the territory west of the one hundredth meridian known as the Range, and already this region is producing about one-half of the total number of sheep.* It appears that for the past few years sheep have been rapidly crowding the cattle off the northern portion of this territory, but although the actual conditions are there favourable to the grazing of stock in large numbers they do not permit of the production of sufficient feed to properly fatten and finish the animals. The finishing can only be done by drawing on the surplus crops of the States of the upper Mississippi valley, and this is now largely the practice. It was formerly thought that sheep were only suited to the inferior lands, but during the past few years large flocks have been fattened annually in the grain producing States and practical feeders and farmers in the maize-belt area are said to have discovered that there is no more profitable outlet for their surplus grain products than in mutton production.

LIVE STOCK CENSUS IN DENMARK.

The preliminary returns of the census of live stock taken in Denmark during the past year furnish the following comparative statement of the number of animals in the country in 1893 and 1898 respectively.

	1893 No.	1898 No.
Horses - - - - -	410,639	449,264
Cattle - - - - -	1,696,190	1,743,440
Sheep - - - - -	1,246,552	1,074,413
Swine - - - - -	829,131	1,178,514
Goats - - - - -	25,266	31,803

* In the eleven States west of the 100° meridian there were estimated to be on January 1 1899, 22,020,762 sheep and lambs out of a total for the entire country of 39,114,453.

Among the horses enumerated in the latter year, there were 3,110 stallions, 132,752 geldings, 196,430 mares, 73,539 young horses under three years old, and 43,433 foals under one year.

Compared with the returns for 1893, the principal features revealed by an examination of the details for cattle in 1898 are an increase of 56,000 head in cows and a decline of nearly 43,000 in the number of oxen. For these classes the returns just issued show 1,067,139 cows and 69,547 oxen, against 1,011,098 and 112,259 respectively in 1893. It is interesting to note that of the cows returned last year 175,799 were ten years old and over. The other cattle included 41,638 bulls, against 42,005 in 1893; 255,533 heifers, against 246,169; and 309,583 calves, against 284,659 at the earlier period.

Sheep alone show a diminution of numbers since the enumeration of 1893. Rams numbered 40,406 last year, as compared with 49,213 at the earlier date; wethers and fat sheep one year old and over are returned as 65,803, against 90,245; ewes 473,268, against 548,355; and lambs under one year 494,936, against 558,739.

The increase in swine is noteworthy in connection with the development of the Danish bacon trade, to which reference was made in the last issue of this Journal (p. 7).

INDIAN WHEAT TRADE AND PRICES.

The Director-General of Statistics in India, Mr. J. E. O'Connor, states that speculative activity in the United States maintained the price of wheat at a comparatively high level for some time in 1898, and the excellent crop harvested in India in the spring enabled the owners of the grain to put it on the market in large quantities at very profitable rates. The exports of wheat during the official year 1898-99 were, as a consequence, much larger—approximating to a million tons—than they had been since the Russian famine swelled the demand for Indian wheat in 1891; but it is not expected that they will be at all so large during the present official year, because prices in Great Britain have receded to the low level which prevailed for years before the sudden rise of last year.

Prices have also receded in India; and, in the absence of an unusual demand for export, and with a favourable monsoon, it is probable that the level will continue low.

The exports of wheat from India to other countries during each of the last five years have been as follows (in tons):—1894-95, 344,390; 1895-96, 500,146; 1896-97, 95,528; 1897-98, 119,630; 1898-99, 976,187.

MISCELLANEOUS AGRICULTURAL IMPORTS AND EXPORTS.

In the Annual Statement of Trade for 1898 particulars are given of the value of the imports and exports of certain articles of an agricultural character usually included under the heading of "goods unenumerated." The imports included cut and everlasting flowers to the value of £219,000 and manufactured basketware to the value of £249,841. The latter item shows an increase in value of about £12,000 over the corresponding imports of the preceding year; but this was, however, practically counterbalanced by a decline of about the same amount in the imports of willows, which were valued at £28,900. Among the articles of animal produce imported, the principal were glue stock, glue, size, and gelatine, of a value of £544,337, whilst the export of these articles of British produce amounted to £66,983; and the re-exports of foreign manufacture to £59,208. The imports of egg-yolk and liquid egg increased in 1898 to £11,732, from £7,043 in 1897; but albumen decreased from £15,420 to £10,127. Other imports which may be mentioned are fruit juice, £75,343; teasles, £4,116; straw envelopes, straw ropes, etc., £57,878; and dextrine, £8,614.

The exports of British produce included bran, pollards, etc., of a value of £208,586; and animal products valued at £325,455: this item being made up of sausage casings (£128,377), horns (£55,451), hair (£54,501), bones (£36,732), hide cuttings (£28,485), and hair cloth (£21,909). Oil-seed cake and other animal food was exported to a value of £85,306; and unmanufactured animal food to a value of £82,607. Straw plait worth £61,089 was also exported in 1898.

ROPINESS IN MILK AND CREAM.

The Cornell University Agricultural Experiment Station has recently issued a bulletin dealing with the condition of milk known as ropiness. This condition, which is objectionable more on account of its unwholesome appearance than from any known harmful effect which it produces, has received its popular designation from the viscid, slimy consistency which characterises the affected milk. The cause has been found to be the action of certain bacteria, and a number of apparently different species have been described as possessing the power of producing the ropy condition. In the cases investigated by the Experimental Station, *Bacillus lactis viscosus* was found to be the cause of the viscid milk, and the trouble was caused by the use of milk vessels which had not been sufficiently scalded. The bacteria remained in the cans, which had previously contained viscid milk, and were able to survive the washing and thus live to infect further quantities of milk. Greater care in scalding utensils brought the trouble to an end. All small utensils were immersed in boiling water for three minutes, and the larger cans were filled to the brim with scalding water. The source from which *Bacillus lactis viscosus* originally reached the milk cans is not known; but in previous investigations it has been shown that its natural habitat is water, and where the trouble occurs particular care should be taken to avoid the use of unboiled water for cleaning utensils, and also to prevent the cows from wading in water. The bacteria may readily be transferred from water to milk by the agency of mud, which, drying upon the udder, may be dislodged during milking. The importance of thoroughly scalding vessels which have once contained ropy milk is strongly urged in the bulletin.

WATER IN BUTTER.

A recent number of the *Landwirthschaftliche Jahrbücher* contains an article by Herr Benno Martiny dealing with the results of an inquiry, carried out by him at the request of

the Prussian Ministry of Agriculture, into the percentage of water contained in butter. The material for this inquiry was obtained partly from reports received from a number of German agricultural experiment stations, dairy institutes, and schools of the results of the analyses of samples of butter examined in these institutions at the instance of the Ministry, and partly from the published accounts of similar investigations conducted in other countries. In this way the author has brought together analytical data relating to 20,706 samples of butter, of which 4,134 were German, 9,946 Danish, 4,427 Swedish, 613 American, 364 English, 301 French, 207 Canadian, 68 Dutch, 64 Australasian, 62 Italian, 38 Austrian, 14 Swiss. The average water content of the whole of the samples was found to be 14.03 per cent. The variation in the water percentage in the different descriptions of butter is given as follows:—

Description.	Number of Samples.	Percentage of Water.		
		Lowest.	Highest.	Average.
Dairy and Creamery Butter :				
Unsalted - - - -	831	6.8	27.51	14.10
Salted - - - -	17,332	3.84	22.12	13.55
Farmhouse Butter :				
Unsalted - - - -	738	3.68	41.6	14.79
Salted - - - -	841	4.32	49.02	14.74
Butter for Keeping - - -	113	5.06	21.30	10.73
Hamburg Factory Butter (Pack-butter) - - - -	819	16.0	28.0	23.0
Whey Butter :				
Unsalted - - - -	30	10.09	20.68	15.58
Salted - - - -	2	14.05	14.73	14.39
	20,706	3.68	49.02	14.03

As the result of his inquiry Herr Martiny is of opinion that butter, whether salted or unsalted, which contains more than 20 per cent. of water has either been carelessly prepared or intentionally impoverished or adulterated, and he suggests that only butter containing under 16 per cent. of water should be classed as table butter, and that butter with from 16 to 20 per cent. should be described as cooking or confectionery butter.

IMPORTS OF LIVE ANIMALS FROM IRELAND.

The Report of the Irish Veterinary Department for the year 1898 gives tables showing the number of live animals sent from Ireland to Great Britain. Cattle, sheep and swine constitute the bulk of this trade, though horses, asses, mules and goats are also included. The total number so exported in 1898 was 2,270,225 as compared with an average of 2,219, 297 during the preceding five years. The exports of the past year included 803,362 cattle, 833,458 sheep, and 588,785 swine; whilst 38,804 horses, 2,277 asses or mules, and 3,539 goats were also shipped to British ports.

The description of cattle exported are set out in the table below, which shows the number sent from Ireland to Great Britain during 1898 and the preceding five years.

Year.	Fat Cattle.	Store Cattle for Fattening or Breeding Purposes.	Other Cattle.	Calves.	Total.
1893	316,344	318,545	8,473	45,307	688,669
1894.	330,748	422,534	7,805	65,867	826,954
1895.	302,555	414,859	5,622	68,571	791,607
1896.	274,472	349,800	3,837	53,451	681,560
1897.	259,173	419,302	5,043	62,494	746,012
1898.	278,770	460,903	4,101	59,588	803,362

The number of store cattle exported in 1898, viz., 460,903, was greater than in any previously recorded year, the largest number in any recent year being in 1894, when 422,534 cattle were exported; but the total exports of cattle of all descriptions in 1898 were 23,000 below the total for 1894; they were, however, the second highest number recorded. The total number of cattle exported appears to have been maintained during the five years shown in the above table at a level considerably above that of previous years. Thus the average exports in the last twenty years have been as follows :

1879-83	-	-	-	-	-	-	654,691
1884-88	-	-	-	-	-	-	696,334
1889-93	-	-	-	-	-	-	649,103
1894-98	-	-	-	-	-	-	769,899

The number of sheep and lambs exported in 1898 was 833,458, which was higher than that of the three previous years, but considerably below the four years 1891-94, when an average

of one million per annum was exported, the highest figure being 1,107,960 in 1893. With regard to swine, the total exportation in 1898 amounted to 588,785. Of this number 556,723 were fat swine, and 32,062 were store swine, the latter figure being rather below the average. The number of fat swine exported, though lower than the figures for the two previous years, is nevertheless higher than in any other year.

DEVELOPMENT OF DANISH MEAT TRADE.

At the close of the sixties, after the separation of Schleswig and Holstein from Denmark, there came a change in the development of Danish agriculture, whereby its course was directed in a comparatively few years into that of an extensive production of animal food, the result of which was that the surplus exportation of such produce, which in 1866 was valued at £777,800, amounted in 1897 to £9,444,400. It was brought about by the rapidly increasing development in the seventies of dairy-farming by means of co-operative dairies, which in the course of a few years extended over the whole country, the islands first. Naturally the export of butter greatly increased from year to year. In 1885 it reached the value of £1,277,800; in 1895 of £4,388,900; and it is still year by year increasing. This movement not only increased the number of milch cows, but gave a considerable impetus to pig-rearing, as the most profitable way in which the waste products of the dairy could be utilised. The surplus exportation of pigs kept at an average of 26,000 yearly from 1864 to 1871; with the progress in dairy-farming it increased so much that, in 1872, it reached over 100,000, and in 1887, when it ceased for a time, it had reached 232,000, or a value of £833,300. The surplus exportation of bacon and hams during the latter year amounted to £666,700, so that the total exports of swine and hog-products for that year amounted to £1,500,000. The pigs were principally sold in Germany, through the Hamburg market, whence some went into the interior, whilst others were slaughtered at the local bacon

factories for the English market. This trade suddenly ceased in 1887, when Germany, on account of the outbreak of swine fever in Denmark, closed her ports against imports of Danish swine for some years. The disease was comparatively quickly stamped out, but it gave a great impetus to bacon curing, so much so, that in the course of a few years about 30 bacon-curing factories sprang up, of which at least two-thirds are on the co-operative principle. Competition has perhaps been too keen, but without doubt a considerable market has been worked up for Danish bacon in England. How this industry has grown will be seen from the following figures : between 1891 and 1895 the average net exportation of pork (principally bacon) rose to the annual value of £1,722,200, while the annual exportation of live pigs, which was resumed to Germany in 1890, and which consisted principally of large fat bears and sows that were not adapted for bacon, rose to £555,600 in value, making altogether £2,277,800. For the last three years the importation of live pigs has again been prohibited by Germany, but Denmark's exports of pork products has increased, their value in 1897 being £2,888,900.

The exportation of fat cattle is, owing to force of circumstances, about to undergo a similar industrial development, whereby part will in future be exported as fresh meat, and part as preserved meat and sausages. For many years store cattle were fattened in the marshes, and then exported to England, via Tønning, and from 1864-71 the export amounted to 40,000 cattle yearly, and reached double that number twenty years later, valued approximately at £950,000. The importation of cattle from Europe into Great Britain was prohibited in 1892, and in 1893 Germany, in consequence of an outbreak of foot and mouth disease, closed her ports against Denmark, at a time when the export of cattle was most active. The animals were then slaughtered in order to export them as meat. Germany rescinded the prohibition in 1894, but in 1895 fresh restrictions were imposed, and it became almost impossible to export live cattle from the commencement of 1898. Since then dead meat has been exported on a large scale, and arrangements have been

made for continuing this trade by the erection of export slaughter houses at Esbjerg, Kolding, and several other places. The largest portion of the meat exported in 1898 went to Germany, from which country the profits have been larger than those from England.

Whether this export of meat will continue to grow, or whether the export of live cattle to Germany will again be revived depends, of course, upon the future import regulations of that country.

During the last two years a large trade has sprung up in sausage-making. The various bacon factories have also taken up this industry.

In 1894 the Danish Government passed a law that all exported meat was to be subjected to a sanitary inspection, and it has further appointed a Commission to carry out a system of State-controlled examination of all exported meat products.

(Foreign Office Report, Annual Series, No. 2301, Price 2½d.)

PRODUCTION OF HOPS IN THE UNITED STATES.

The Board have received from Mr. John Hyde, Statistician to the United States Department of Agriculture, a copy of a circular containing estimates of the production of hops in that country. The latest official estimate as to the acreage yield and value of the hop crop is that of the last census, and the following table shows these particulars for the year 1890 (all amounts of hops are given in bales of 180lbs.).

States	Acres.	Bales.	Value.
New York - - -	35,552	99,229	£ 1,264,200
Washington - - -	5,282	49,348	476,032
California - - -	3,796	31,761	317,052
Oregon - - -	3,223	21,174	218,172
Wisconsin - - -	871	2,556	29,625
Other States - - -	238	780	8,549
Total -	48,962	204,848	2,313 630

The crop in the Pacific States for 1894 and 1895 was given in an earlier circular of the Department of Agriculture, and reproduced in this Journal (Vol. IV., p. 495.) Particulars for later years for these States, and also for New York, are given in the following table.

States.	1898.	1897.	1896.
	Bales.	Bales.	Bales.
New York- - - -	65,000	75,000	75,000
California - - - -	35,000	45,000	36,000
Oregon - - - -	60,000	75,000	56,000
Washington - - - -	30,000	32,000	12,000
Total -	190,000	227,000	179,000

These estimates are taken either from newspapers, or from information furnished from unofficial sources. No details can be given for Wisconsin or other States, but their total is comparatively insignificant.

The total production of these four States is estimated to have increased steadily from 201,500 bales in 1890 to a maximum of 319,500 bales in 1894. At the same time New York State increased its production to 140,000 bales in 1894, at which [date the three Pacific States named produced 180,000 bales.

The exportation of hops from the United States in the last five fiscal years, as shown by the reports of the Bureau of Statistics of the Treasury Department, was as follows :—

Years ending 30th June.	Bales of 180 lbs.	Value.	Value per cwt.
		£	£ s.
1898 - - - -	95,343	550,579	3 12
1897 - - - -	63,479	271,705	2 13
1896 - - - -	93,140	308,108	2 1
1895 - - - -	97,352	390,124	2 10
1894 - - - -	97,072	800,882	5 3

The importations in the same years were as follows :—

Years ending 30th June.	Bales.	Value.	Value per cwt.
		£	£ s.
1898 - - - -	13,200	135,932	6 7
1897 - - - -	16,766	131,247	4 17
1896 - - - -	15,400	125,087	5 1
1895 - - - -	17,409	124,947	4 9
1896 - - - -	4,600	100,920	13 13

SILESIA Wool.

The Consul-General at Breslau reports that the wool produced in the province of Silesia has not only decreased in quantity during the last five years, but the quality has deteriorated. Breslau, the capital of the province of Silesia, is the chief market in Germany for all kinds of wool. The amount of wool offered for sale in Breslau during the year 1898 was as follows :—

Old fine to extra fine Silesian wool—	lbs.
Washed - - - - -	495,000
In the grease - - - - -	275,000
Wool of sheep more or less crossed with Rambouillets, fleece washed and in the grease - - - - -	825,000
Better quality of Posen wools, washed and in the grease	550,000

In 1897 the amount of wool offered for sale was 10 per cent. less than in 1898, but in 1894 it was at least 50 per cent. greater than in 1898, and the quality was better. On account of the importation of Australian and Argentine wools into the market since 1894, the price of wool has been very low. Consequently, the farmers who had been raising sheep for pure Silesian wool, imported English and Scotch rams, and the cross produced larger sheep for meat purposes, but a quality of wool inferior to the pure old Silesian product, which is known for its soft, silky, and long fleece as one of the finest qualities of wool, and was sought after by the manufacturers of fine cloths, dress goods, and shawls. For the production of these goods the manufacturers are now mixing the fine Silesian with wool imported from Sydney and Port Philip.

DANISH AGRICULTURAL EXPORTS IN 1898.

In his Annual Report on the Trade of Denmark in 1898 the British Consul at Copenhagen says that, compared with 1897, there was a falling off to the amount of £674,000 in the value of the export of live animals (cattle, horses, sheep, lambs), but on the other hand the export of meat, etc., has risen considerably, and amounts to about £1,467,000.

The export of butter increased by 17,325,000 lbs., valued at

£700,000. The increase in 1898 is attributed to an abundance of good grass in summer, and to the great care with which the cows are managed, every attention being paid to feeding. Each year sees less fattening of stock, on account of dairying being so much more profitable as long as prices keep good. The average weekly price for butter in 1898 as quoted by the Danish Chamber of Commerce was 10·71d. per pound as compared with 10·83d. in 1897 and 11·16d. in the preceding year. Swedish and Finnish butter to the amount of 22,500,000 lbs. was imported by Denmark, and was re-exported again by Danish butter merchants to various countries.

Bacon salted on the "Autocure" method, to which reference was made in the Consular report for 1897, is stated to have been introduced with success. It appears that the trial laboratory in Copenhagen has been and is still carrying out experiments in this method of curing, and also in a second one, invented by a M. Fjelstrup, the chief point of which is a process whereby the carcase is emptied of all blood and a solution of salt is at the same time injected to replace it.

The following table gives the Danish exports to Great Britain of bacon and hams, butter and eggs, in 1898, and Denmark's total imports and exports of the same articles :—

Articles.	Imports.		Exports.		Exports to Great Britain.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Bacon and hams lbs.	9,020,000	£ 161,111	134,750,000	2,805,555	128,300,000	2,700,000
Butter - - lbs.	33,070,000	1,566,667	159,830,000	7,166,667	155,870,000	6,977,778
Eggs - - score	1,300,000	66,667	13,400,000	761,111	12,600,000	715,667
Total - -	—	1,794,445	—	10,733,333	—	10,394,445

[*Foreign Office Report, Annual Series, No. 2301. Price 2½d.*]

VICTORIAN REGULATIONS FOR IMPORTED LIVE STOCK.

In connection with the reference in the June number* of this Journal to the quarantine regulations of Australasia, it

*Vol. VI., No. 1., p. 16.

should be noted that by an Order in Council, dated June 1899, the Victorian Government have rescinded the order dated December 19, 1898, relating to the quarantine of cattle and sheep from places outside the Australasian colonies and New Zealand, except so far as the order relates to pigs. The order also provides that cattle, sheep or pigs intended to be introduced into Victoria from any place—other than one of the Australasian colonies, the introduction of pigs from New Zealand having been prohibited—shall remain in quarantine, in the case of cattle not less than 40 days, and in the case of sheep and pigs not less than 30 days, and in the case of sheep from Germany and the United States of America not less than 60 days, during which time, in the case of sheep, they shall be washed, dressed, and disinfected as the Chief Inspector of Stock may direct, and in the case of cattle any animal suspected to be affected with tuberculosis may be subjected to the tuberculin test. The owner, if required by the inspector, shall render all necessary assistance to facilitate the operation; and until, after the expiration of the said periods of 40 days, 30 days, or 60 days, as the case may be, the animals have been examined by a veterinary surgeon, approved by the Governor in Council in that behalf, and an inspector of stock, and by them declared in writing to be free from infection, no person shall, whether before or after the expiration of the quarantine, remove or drive any such cattle, sheep, or pigs, or suffer any such cattle, sheep, or pigs, to escape from the quarantine ground until an inspector of stock by writing under his hand has authorized their removal.

GOATS IN THE UNITED STATES.

According to an article published in the Year Book recently issued by the Department of Agriculture at Washington goat breeding for profit has not hitherto received much attention in the United States. It appears, however, that in a few of the sparsely populated Western and Southern States, small

herds have been kept for centuries, and a not inconsiderable number of goats are kept for their milk in the suburbs of cities. Goats are not included in the American census returns of live stock; but their numbers are recorded, separately or with sheep, in the assessment lists of several States, and with the aid of the data from these sources the total number of goats in the United States is estimated to amount to 500,000 head, of which about 252,000 are found in Texas.

Very few of the goats in the United States are raised for the purpose of marketing their skins. Large numbers of the common breed are kept for milking purposes, as stated, in the suburbs of cities, and many of the same stocks are kept in parts of the West with sheep for protection against other animals, as dogs, wolves, and coyotes; while increasing flocks of Angoras are kept principally for their valuable yield of mohair, though some account is now taken of the meat. It is stated that something like two-fifths of all the goats in the country are in part descendants of the common goat modified by successive infusions of pure Angora blood; and in part, but to a less extent, pure Angoras kept in California, Texas, Oregon, Idaho, Iowa, Georgia, and South Carolina in flocks sometimes numbering thousands, and in other States in smaller numbers. The profitable commercial product of these pure and high-grade animals is the silky fleece, and fleece-production is, it seems, the only branch of the goat-keeping industry which has so far attracted any attention.

In connection with the foregoing observations it may be noticed that it is estimated that the goat-skins imported into the United States in the year ended June 30th, 1898, represented the produce of 16,227,000 goats and kids.

(*Year Book of the U.S. Department of Agriculture for 1898.*)

ORDNANCE SURVEY MAPS OF GREAT BRITAIN AND IRELAND.

The Ordnance Survey are issuing a new series of folding pocket maps for England and Wales on the scale of one inch to the mile. The maps are printed in colours on sheets 18 by 12 inches, mounted on canvas, in a cover or flat, price 1s. each. The one-inch-scale map can also be procured at the same

price in black and white, showing outline and contours; or in outline, with hills printed either in black or brown: the outline map has recently been revised. These maps are not only useful for general topographical purposes, but should also prove serviceable to cyclists and pedestrians, since they show all roads, indicating their character and whether metalled or not, footpaths, hills, rivers, towns, villages, railway stations, and local boundaries.

The Ordnance Survey also publish maps on the following scales:—

$\frac{1}{5000}$, or about 10 feet to one mile.	} Price per sheet uncoloured 2s. 6d.
$\frac{1}{10500}$, or 5 feet to one mile.	
Both for towns only.	
$\frac{1}{25000}$, or about $25\frac{1}{3}$ inches to a mile. (This is complete for Great Britain, and in progress in Ireland.)	} 3s. 0d. with areas. 2s. 6d. without areas
$\frac{1}{105000}$, or 6 inches to a mile. (Complete for Great Britain and Ireland.)	
	} 2s. 6d. per full sheet 1s. per quarter-sheet

All the above maps are of various dates, and are periodically revised, except the town maps.

There are agents for the sale of Ordnance Survey Maps in most of the chief towns, and maps can be ordered, and indexes, etc., seen at many Head Post Offices, in places where there are no agents. They can also be ordered, through any bookseller or railway bookstall, from the Director-General, Ordnance Survey Office, Southampton; or in the case of Ireland, from the Officer in Charge, Ordnance Survey, Dublin.

ACREAGE OF HOPS.

On the 30th August last the Board of Agriculture issued the following Preliminary Statement, compiled from the Returns collected on the 5th June, 1899, showing the Acreage under Hops in each County of England in

which Hops were grown, with a Comparative Statement for the years 1898, 1897, and 1896.

COUNTIES.	1899.	1898.	1897.	1896.
	Acres.	Acres.	Acres.	Acres.
BERKS - - - - -	—	—	—	4
GLOUCESTER - - - - -	42	40	40	49
HANTS - - - - -	2,319	2,263	2,306	2,494
HEREFORD - - - - -	7,227	6,651	6,542	6,895
KENT - - - - -	31,988	30,941	31,661	33,300
MONMOUTH - - - - -	—	2	2	—
SALOP - - - - -	138	126	129	140
SUFFOLK - - - - -	4	3	2	4
SURREY - - - - -	1,388	1,313	1,416	1,623
SUSSEX - - - - -	4,949	4,829	5,174	5,908
WORCESTER - - - - -	3,788	3,567	3,591	3,800
Total - - - - -	51,843	49,735	50,863	54,217

AGRICULTURAL DISTRESS IN ROUMANIA.

Information has been received through the Foreign Office that the Roumanian Government has obtained from Parliament a credit of 2,000,000 francs (£80,000) for the purchase and distribution by the State of millet, and for other measures which have been, and will be, incurred in connection with the relief of agricultural distress.

Local authorities have been empowered to contract loans aggregating £140,000 for granting aid to the peasants, who have also received permission to pasture their cattle in the State forests.

All the millet available in the country has been purchased and distributed for immediate sowing; which, it is hoped, will with favourable rains produce not only fodder for cattle, but, in case of necessity, grain for the people.

Reductions have been made in the rates of transport for fodder and cattle by railway. It has also been decided that the State shall purchase fodder, to be sold on credit at moderate prices in the distressed districts.

To encourage the production of food for cattle, the farmers on State lands have been permitted to sow one-fourth of the land which should by regulation be left fallow, with millet; on condition that at least half of the land should be allotted

to the peasantry, and on the understanding that the tithe shall not exceed one-third of the produce.

To favour the retention in the country of the existing stock of cereals, credits will be advanced, at greatly reduced rates of interest, by the "Banque Agricole," on all stocks of maize, oats, and barley which may be deposited with the bank as security.

In an article on "Raising Sheep for Mutton*" Professor Curtiss, Director of the Iowa Agricultural Experiment Station, points out that not all the animals belonging to any of the improved breeds are possessed of a high degree of excellence, and that no graver error can be made than the assumption of uniform excellence in the stock constituting any breed, no matter how much prominence it may have attained. Individual animals always differ more than breeds, and there are relatively few really good animals in any breed. This seems to be strikingly true of the mutton sheep, and the following brief observations by Professor Curtiss on what constitutes a good mutton sheep may therefore be of interest. "First, let there be pronounced masculinity in the male and femininity in the female. Sheep should be neither sexless nor characterless. They should bear the stamp and character of the breed they represent. This breed character is a mark of good blood, and it should be manifest in an unmistakable manner. The sire should be impressive, resolute, and of noble bearing. He should be distinctly the head of the flock in every sense of the word. To meet these requirements he must have good constitutional and vital powers. Without these no animal is fit to head a herd or flock. In selecting a sire, look first at the head. If deficient there, look no further, but reject at once. Insist upon a head that faces you boldly with a wide face, a clear, prominent eye, and a robust character throughout. The head should be joined to a well-filled, round, muscular neck,

* U.S. Department of Agriculture, *Farmers Bulletin*, No. 96.

wide at the poll and back of the ears and gradually enlarging in all lines to a strong, full junction at the shoulder, as seen from top, sides, or bottom. This should be accompanied by a wide chest, a prominent, well-filled brisket, and a full heart girth, giving straight, even lines from the shoulders back. A depression either in front of or behind the shoulder, whether at the top, side, or bottom line, is an indication of weakness. The back should be strong, wide, and well-meated from shoulder point to tail. The hind quarters should be full and well let down in the leg and flank. The legs should be placed wide apart and stand straight. Sickie-shaped hocks and weak, sloping pasterns afford sufficient reason for condemning an otherwise good sheep.'

Some experiments were conducted last year by the South Eastern Agricultural College at Wye

Eradication of Moss in Pastures. to test the effects of mechanical and chemical treatment for the eradication of moss from grass land. Many of the pastures about Wye, where the soil consists of a light loam resting on the chalk, get very mossy in the winter, though as the spring advances and the grass begins to grow the moss is less in evidence. Three reasons are generally assigned for the prevalence of moss: pooriness of the land, sourness, and deficient aeration, but none of these seem to be applicable to the pastures in question. In the first place, the moss is generally most visible where the grass has done well the year before; and secondly, no land could be less liable to sourness, for the chalk rock is less than a foot away, so that there is as much as 40 per cent. of calcium carbonate in the top three inches of soil; the drainage is perfect and the soil is constantly being opened up by the action of worms. Deficient aeration and sourness are certainly not causes of moss, for in any hedgerow on the downs thick cushions of moss may be seen—mere sponges filled with air resting upon pure broken chalk. It was accordingly decided to try by experiment how the development of moss on such

soils could be affected by either mechanical or chemical treatment. Two fields were selected, one an old pasture that had originally "fallen down" and was still in poor order, the other was better land that had been laid down about ten years; uniformly mossy situations were selected and eight plots, one rod square, marked out by cutting lines in the turf. The treatment began in April, 1898, and was repeated at intervals of a month, except during the dry weather; in all, the plots have been dressed five times. So far as the trials have gone, benefit seems to have accrued from dressings of salt and of superphosphate; rolling has produced a slight beneficial effect, and raking has removed much of the moss; lime, basic slag, sulphuric acid, and sulphate of iron have produced no appreciable effect; organic matter in the shape of sugar and lifting the turf have perhaps made the moss worse. The trials are being continued.

[*Report on Distribution of Grants for Agricultural Education. C.—9431.*]

The Cornwallis and Annapolis Valley is the principal fruit-growing district of Nova Scotia. It is one continuous valley of about 100 miles in length, and varying in width from 6 to 11 miles, situated between two nearly parallel ranges of hills of about 600 feet in height. Apples and plums are grown throughout the valley, and in the centre near the towns, raspberries, blackberries and strawberries are grown, and also some peaches and a few grapes. The apples are largely sent to England; most of the soft fruit is sent to Halifax and Boston, but the market for these is at present rather limited. In the centre of the valley there is a large area of bog land, which has been found well adapted to cranberry growing, an industry that is rapidly increasing. The area of the farms in this district usually varies from 20 to 150 acres, consisting of about equal parts of grass and arable land, and including 1 to 5 acres of

apple orchard. There are a few farms with as many as 60 or more acres of orchard land, but a large proportion of this has been planted within the past ten years, and is not yet in full bearing. The apples intended for export are packed in barrels, costing 10d., and holding from 120 to 140 lbs. of fruit; and the freight charges to Liverpool or London from the Annapolis Valley, via Halifax, amount to 4s. 2d. per barrel, made up of railway carriage 1s. 8d. and steamer charges 2s. 6d. The salesman's commission in London is usually 5 per cent. It is estimated that the average net price received by the grower in Nova Scotia was for the crop of 1896, 4s. 2d. per barrel; for that of 1897, 8s. 4d.; and for that of 1898, 6s. 3d. In 1896, the production of apples in the Colony was estimated at 750,000 barrels, of which 450,000 were exported to England.

The importation of plants, shrubs, trees, and flower roots into the United Kingdom has been

**Importation of
Plants, Shrubs,
etc.**

steadily increasing during the past 20 years; in 1879 the value of these imports was returned at £137,000, in 1884 it reached £212,000, in 1890 £308,000, whilst in 1898 it was £436,600. Of this last named sum the imports from Holland accounted in 1898 for more than half, viz., £221,800; Belgium, France, and Germany each sent goods valued at between £40,000 and £50,000; the importations from Japan, the United States, Colombia, and the Channel Islands were each returned as worth over £10,000; while Brazil and India sent shipments valued at £6,300 and £4,900 respectively. The figures given above do not include cut flowers, which were imported in 1898 to the value of £219,000, so that the combined value of plants and flowers imported into this country in the past year amounted to over £650,000.

The countries to which plants and shrubs of British production exported are sent are not separately distinguished, but the total value of these exports in 1898 amounted to

£35,500, whilst the re-exports of foreign plants amounted to £10,805.

In the "Danish Export Review" for October, 1898, an article appeared on the cultivation of cauliflowers for seed. This vegetable is grown in the environs of Copenhagen, and, on account of its large yield of seed and its high price, it has during recent years earned much importance as an article of export. The article goes on to say that the soil and climate appear to be peculiarly adapted for this kind of seed, and the species cultivated is what was originally called "Erfurt dwarf cauliflower," now known as the "Copenhagen Cauliflower," or, as the Americans call it, "Snowball Cauliflower." This species has been grown for the last 30 or 40 years, and at first the seed was principally sent to France and Germany, but it is now sent to Russia, Austria-Hungary, Great Britain, North and South America, and Australia. The largest seed grower has about eleven acres under cultivation. Sheds are lined with machinery for drying and threshing the seed stalks, after which the seed is cleansed and sorted by other machines, and finally, by means of careful attention to sorting, seeds of a uniform colour are produced.

[*Foreign Office Report, Annual Series, No. 2,301. Price 2½d.*]

The Board have received through the Colonial Office a copy of an Act, dated 28th October, 1898, to prevent the introduction into Western Australia of diseases affecting orchards and gardens, to provide for their eradication, and to prevent their spread. This Act empowers the Governor to prohibit, by proclamation, the introduction of any plant, fruit, fungus, parasite, or insect, which is likely to introduce diseases of vegetation into the country, and, generally, to take any measure necessary for the protection of orchards from disease.

The number of rabbits and hares exported from New Zealand has increased during the past five years from 25,240 in 1894 to 4,251,600 in 1898; they are exported frozen in their skins. The principal development in this trade appears to have taken place in 1897. In 1896 the number exported was 358,000, valued at £7,000, but in the succeeding year no less than 2,229,000 were exported of a value of £46,400. Notwithstanding the increased number exported in 1898, the trade appears to have been more remunerative, the value at which they are returned rising from £2·08 per 100 in 1897 to £2·21 in 1898, or an increase of about 2s. 7d. per 100.

Among the by-products of the dairy is sugar of milk, which is made from the whey obtained from cheese factories or creameries, and is mainly used in the preparation of drugs and medicines and various foods for infants and invalids; it has a very delicate, sweet taste, but is not so sweet as cane or beet sugar. In a bulletin issued by the United States Department of Agriculture, it is stated that this component of milk was discovered late in the 17th century, but it was not until the first half of the present century that practical methods were invented for separating the sugar from the milk in a white and crystalline form. For many years Switzerland was the principal producer, though small quantities were made elsewhere. The United States was at one time the principal customer of Switzerland, and took about three-fourths of the total exports, which were valued at £12,500 annually. Between 1880 and 1890 the manufacture of sugar of milk became established in two or three places in the United States. The price of the article in America was at that time about 15d. to 18d. per pound, but it has since fallen to between 5d. and 8d. per pound. There are now in the States of New York, Ohio, and Illinois four or five factories of considerable size making sugar of milk. They use whey from

neighbouring cheese factories, for which they pay 2d. to 3d., and sometimes $3\frac{1}{2}$ d., per 100lbs., usually delivered at the factory. From this is obtained from $2\frac{1}{2}$ to 3 per cent. of its weight in refined sugar. The quantity exported to Europe is stated to be increasing, but as the article is not separately distinguished in the Trade Returns no figures are available.

The Austro-Hungarian Consul-General at St. Petersburg reports to his Government that of all the **Sugar Syndicate in Russia.** Russian industrial syndicates that of the sugar manufacturers is the best known.

This syndicate was founded at Kiew on the 28th of April 1887, and was re-established in 1895. The object of this society, to which 210 of the 227 Russian sugar factories belong, is the regulation of the sugar industry by fixing the obligatory exportation of a certain quantity of sugar which cannot be consumed in Russia. For this purpose the syndicate fixes for each factory a normal limit of production for home consumption, and all sugar in excess of this limit must be exported. In fixing this limit, the demands of the home market and the product of factories not belonging to the syndicate have to be carefully taken into consideration. Another aim of the syndicate is to raise the prices, which fell in consequence of the over-production of the year 1895; and another is to gain more trustworthy accounts of the condition of the provincial markets. The syndicate was obliged to dissolve in 1895, because differences of opinion among certain of the members prevented the necessary renewal of the agreement. But on the 20th of November, 1895, it was re-established, in closer connection with the Government, and on a firmer basis.

The following precautions should be carefully observed by the cheese-maker, should he by any accident get into his dairy a diseased curd or a curd containing any taint. Let him

Taints in Cheese. remember that the mere contact of his hands with such curd

is sufficient to convey the bacteria which cause that taint to the surface of any utensil which he may subsequently handle. It is therefore imperative when any taint arises to get that curd out of the dairy, so far as possible, before the evening's milk comes in. On no account should any of the whey which has come from the tainted curd be used in the next day's cheese. In fact, the whole of the whey should be got out of the dairy as quickly and as thoroughly as possible, and every utensil should be cleaned with, if possible, more than usual care, but especially the handle of the breaker with which that cheese was made.

[*Investigations into Cheddar Cheese-making.* C.—9374.]

The insurance paid by the State Cattle Insurance Department in Bavaria for animals which die is seven-tenths, and in the case of animals compulsorily slaughtered eight-tenths, of the value of the animal. When cattle are slaughtered for food, and the meat is declared to be unfit for human consumption, seven-tenths of the value is paid. When an insured animal dies or is compulsorily slaughtered, the carcase belongs to the Department. Compensation for losses of cattle is paid by the State, and £7,175 was so paid for 735 cattle which died of anthrax in 1897, the largest amount hitherto paid. As half the cattle in Bavaria belong to cultivators of less than 20 hectares (50 acres), who make up 80 per cent. of all the cultivators in the kingdom, and as the average number of cattle kept by these small holders is only two or three head, the importance of insurance is evident.

[*Foreign Office Report, Annual Series, No. 2,294.* Price 1½d.]

According to the agricultural statistics of Ireland, the number of dairy factories in that country of which particulars were obtained in 1898 was 387, or 63 more than in the preceding year. Of these 387 factories 109 were owned by individual proprietors, 113 were the property of joint-stock companies, and 165 belonged to co-operative societies of farmers. In these factories were 830 milk-separators, mostly worked by steam power. Of the total number of factories 278 were in Munster, in Leinster there were 41, in Ulster 44, and in Connaught 24. The quantity of butter returned as produced during the year ended September 30th, 1898, was 360,798 cwts., against 294,105 cwts. in the preceding year. Of cheese 1,280 cwts. were produced; and of condensed milk 30,832,342 lbs.

The total exports of butter from Finland during the year 1898 amounted to 257,000 cwts., of which 244,000 cwts. were produced in Finland, while the remaining 13,000 cwts. were Russian butters shipped from Finnish ports. In 1897 the exportation amounted to 286,000 cwts. of Finnish and 29,000 cwt. of Russian butters. Nearly all this butter was shipped from the port of Hango. Of the total exports of last year about 58 per cent. was shipped to England, 40 per cent. to Denmark, and 2 per cent. to other countries, while in 1897, 52 per cent. was shipped to England and 46 per cent. to Denmark, but the greater portion of the shipments to Denmark is re-exported to British ports, so that it is estimated that about 85 per cent. of the entire quantity exported eventually reaches Great Britain.

Thus it appears that the direct trade with England is increasing. The decrease in the export of butter from Finland during the past year is attributed to the small harvest of 1897, and to a larger consumption of butter at home.

SMÖR TIDENDE.

According to a report by Mr. D. Wilson, Dairy Expert for Victoria, it appears that the dairy trade

**Exports from
Victoria.**

is gradually recovering from the effects of the drought which extended over the seasons 1895-6, 1896-7, and 1897-98. The quantity and value of butter exported fell from 11,584 tons in 1894-95, valued at £1,081,243, to 7,157 tons in 1897-98, valued at £670,090. With the break-up of the drought milk production rapidly increased, and, in consequence, the export for the year ending April 30th, 1899, amounted to 8,888 tons, valued at £888,000. Of this quantity of butter 7,100 tons were consigned to London, 1,000 tons were sent to West Australia, and 700 tons were consigned to the Cape Colony.

The next most important article exported through the Agricultural Department is rabbits, of which no less than 1,210,139 pairs were exported in 1898-99, of a value of £90,000. This trade was started in 1894-5, when 89,000 pairs of rabbits were exported. Among the other products which were shipped under the superintendence of the export branch of the Department were condensed milk and cream, valued at £3,136; meat to the value of £23,000; fruit, £5,000; hares, poultry, and eggs, about £1,600.

In his report to the Foreign Office on the trade of Bavaria,

**Horse Breeding
in Bavaria.**

Mr. Frederic Harford says that great endeavours are being made in Bavaria to encourage horse-breeding, and especially the breeding of cavalry remounts, which at present come chiefly from North Germany and Hungary, in spite of the export tax in the latter country. At the horse fair, held annually at Munich in April, prizes are given for horses of all classes, and a lottery takes place for a number of horses bought at the fair. Very high prices are given for heavy brewers' dray horses, mostly "Belgians." In 1898, 289 thoroughbreds, including 141 mares, were imported into

Germany. Of these, 148 came from England, 35 from Ireland, 34 from Hungary, 12 from Austria, 31 from France, and the rest from America, Belgium, Italy, New Zealand, Sweden, Argentina, and Switzerland. At the State breeding studs in Bavaria in 1897 there were 527 stallions, including 21 English thoroughbreds (average value £350), 4 Arab thoroughbreds (average value £250), 163 English half-breds (average value £175), 3 Anglo-Arabs (average value £150), 4 American trotters (average value £350), 224 East Friesians (average value £130), and 108 draught entire horses, such as Clydesdales, Belgians, Pinzgau, and other German breeds (average value £125).

[*Foreign Office Report, Annual Series, No. 2,294. Price 1½d.*]

REPORTS ON FOREIGN CROPS.

CROPS IN THE UNITED STATES.

The September report of the Statistician of the Department of Agriculture at Washington furnishes the following particulars as to the condition of the principal crops in the United States on September 1st, 1899.

The average condition of the entire wheat crop when harvested was 70·9, or 15·8 points lower than the average of last year, and 14·8 points lower than that of 1897. It is the lowest average condition when harvested for the past twenty years. No quantitative estimate of the wheat crop will be made by the Department pending a revision of the acreage figures in the North-West and on the Pacific slope.

The general average condition of maize was 85·2, or 1·1 better than at the corresponding date last year, and 5·9 higher than in 1897. Oats had an average condition of 87·2, an improvement of 8·2 points on the average at the same date in 1898. Barley showed an average condition of 86·7, this being 7·5 points higher than that of last year. The average condition of potatoes was 86·3, or 8·6 points better than that recorded for the 1st September, 1898.

THE INDIAN WHEAT HARVEST 1898-99.

The final general memorandum on the Indian wheat crop was issued on the 31st May, 1899. It states that the conditions for the successful growth of wheat were on the whole very favourable in Bengal and in the North-Western Provinces, and in those tracts the yield of the harvest exceeded the good returns of 1898 and were greatly in excess of the average of recent years, affected as this was by

consecutive bad seasons. These good conditions, however, did not extend to the Panjab. In that province the season was pronouncedly adverse; insufficient rain, which injured the crop, being followed by unusually hard frosts, then by rust and insects, and finally storms and high winds when the grain was on the threshing floors. The outcome was a yield much smaller than would have been taken from the area sown in a good season, the crop on land not protected by irrigation sustaining great injury. In the adjacent province of Sind also the deficiency in the inundation resulting from the absence of rain led to similar results.

In Central and Western India the conditions were generally not favourable to the reaping of a fine wheat harvest. Over most of this region the rain, after allowing sowings to be made, held off thereafter, or the monsoon ended too soon, and the drought interfered seriously with the progress of growth. From a great many places too reports had been received of injury caused by rust and rats, as well as by frost. In Bombay rain in September and good rain in the winter restored the position and the yield was good, but in the Central Provinces and Berar the harvest was very poor.

The final estimates of the yield of the wheat crop in various provinces are as follows:—

Province.	Area.		Yield.	
	1898-9	1897-8	1898-9	1897-8
	Acres.	Acres.	Tons.	Tons.
Panjab - - - -	7,729,200	8,013,800	1,977,777	2,358,975
North-Western Provinces and Oudh - - - -	4,840,776	4,537,351	1,808,516	1,773,488
Bengal - - - -	1,594,600	1,569,500	666,800	592,600
Central Provinces - - -	2,521,472	2,171,714	458,642	543,095
Bombay - - - -	2,138,836	2,004,832	656,136	627,914
Sind - - - -	352,138	591,621	77,543	177,160
Berar - - - -	436,362	390,378	21,892	25,511
Nizam's Territory - - -	1,196,520	1,091,595	37,225	33,170
Rajputana - - - -	1,109,214	1,183,233	262,451	282,955
Central India - - - -	1,277,480	1,212,832	241,620	240,102
Mysore - - - -	4,029	4,363	492	331
Total - - - -	23,200,627	22,771,319	6,209,094	6,655,301

Converted into imperial quarters of 480 lbs. the estimated yield of 1898-99 amounts to 28,975,772 quarters compared with 31,058,071 quarters in the previous year.

CROPS IN RUSSIA.

According to a report published by the Russian Ministry of Agriculture in the *Messenger Officiel*, the condition of winter wheat at the end of July had improved throughout European Russia, except in the southern provinces, where it was for the most part a failure. On the whole, an average harvest of this crop was looked for, although considerable variations were manifest in the prospects reported from different districts. Better reports were forthcoming with regard to spring wheat, and the harvest of this grain was expected to yield much more satisfactory results than in the case of the winter sown grain. The hay harvest had terminated under satisfactory conditions in most provinces, but it was generally slightly below the average.

CROPS IN POLAND.

According to reports received from H.M. Consul-General at Warsaw, continuous wet weather has proved prejudicial to the crops of Poland; nevertheless, although the general opinion seems to be that the yield will prove under average, this view is not held universally. The area under grain appears to be about the same as in previous years, and spring grain generally promises to be better than corn sown in the autumn. Potatoes suffered less than might have been expected from the cold and rain. Beet will probably give a smaller crop than last year.

CROPS IN AUSTRIA.

According to the report of the Austrian Ministry of Agriculture, referring to the middle of August, the wheat harvest had been at that date almost entirely gathered in. The crop was reported moderate both in quantity and quality, com-

plaints having been received of the general prevalence of "blight." Rye had also been nearly all harvested; the quantity was described as fair, but, the grain being reported to be only partly developed, the quality was poor. A similar remark applies to barley, the harvest being over except in some parts of the north-east. The quantity was satisfactory, but the grain was said to be generally discoloured. Oats promised an excellent yield. Maize, on the other hand, was badly developed, and, except locally, its prospects were not bright. Sugar-beet was generally doing well, and a good crop was confidently expected. Vines were, generally speaking, ripening rapidly; but black rot had been very prevalent. Fruit had been satisfactory in only very few districts.

CROPS IN HUNGARY.

The official estimates of the Hungarian harvest, received through the Foreign Office, indicate that the total yield of wheat this year is about 17,122,000 quarters, or about 1,127,000 quarters more than last year. Of rye the yield is rather more than last year, viz., about 5,552,000 as compared with 5,408,000 quarters. The quantity and quality of both these cereals is described as average. The quantity of barley is also average, and about the same as last year, amounting to 6,927,000 quarters; but there are numerous complaints as to quality, and the grain is of a bad colour. The production of oats is also about the same as last year, viz., 8,074,000 quarters. The quality is reported to be excellent. As regards other crops, maize was fairly satisfactory, but rain was wanted: a yield of 16,000,000 quarters was anticipated, as compared with 17,254,000 quarters last year. Sugar beet was doing well generally; vines were suffering from *Pero-nospora*, and stood in need of rain; while fruit had only given a poor yield.

CROPS IN FRANCE.

The latest official returns as to the condition of crops in France indicate that there will be a good crop of wheat:

nine departments gave the condition of this grain as very good, sixty-seven as good, and eight as fairly good, while in one (Corsica) the outlook was bad. These indications were, however, not quite so promising as they were a couple of months previously. The condition of rye was also good. Neither barley nor oats could be described as more than fairly good, but barley seemed a little the better of the two. Vines promised well, but the cider prospects were only poor. Most of the districts cultivating sugar-beet reported the condition of this crop to be good. The condition of potatoes was generally good, but only fairly so in some departments. Clovers and grasses were only fair.

CROPS IN GERMANY.

The latest official reports on the condition of crops in Germany state that hot and dry weather had prevailed up to the middle of August. This had rapidly ripened the corn crops and hastened on the harvest operations, but had been injurious to clover and grass; potatoes, lucerne, and rye also showed some deterioration. A comparison of the condition of the crops in August last with the previous six years indicates that the corn crops are better than usual, although not likely to be quite as good, on the whole, as last year. On the other hand, potatoes have often been better, while clover and hay are much below the average, and compare still more badly with last year. There have been numerous thunderstorms, but comparatively little damage is reported from hail. Field mice have increased considerably, owing to the dry weather.

The grain harvest is reported to be most promising in the south, where the prospects are as good as last year; wheat is generally better than rye. Oats and barley have in many cases ripened too rapidly. This applies also, but apparently to a less extent, to the autumn sown cereals. Reports concerning potatoes vary; this crop would appear to be poor in the eastern districts of Prussia and in Saxony, but generally good elsewhere. Clover is unequal, it has,

generally speaking, suffered much from the drought, except in central Germany, where the second cut seems a fairly good one. Meadows have greatly deteriorated, and in many places their condition is bad.

CROPS IN ROUMANIA.

Advices received through the Foreign Office show that since the last estimate of the condition of crops in Roumania, the outlook has considerably improved, owing to the fall of copious rains throughout Moldavia and Wallachia. Although the greater part of the wheat, barley, and oat crops are stated to be irretrievably lost, there is now good hope for the maize, which is the most important of all; and with a continuance of seasonable rain a fair average production may be expected. In this event, the danger of absolute famine would be averted, although there may still be much loss among the cattle. Locusts have appeared in the Dobrudja, and several battalions of soldiers have been engaged for some time in combating them.

The official returns of the Roumanian harvest this year, relating to wheat, barley, rye, and oats, show that the production of these grains has been only from a half to a fifth of the average; colza is about a third of the average; while the flax has been almost a total failure. The area and produce of these crops are given as follows:—

CROP.	AREA.	PRODUCTION.	YIELD PER ACRE.	
	1899.	1899.	1899.	Average 1894-8.
	Acres.	Bushels.	Bushels.	Bushels.
Wheat - -	4,103,560	25,258,560	6.1	14.8
Rye - - -	467,670	1,926,920	4.1	15.7
Barley - -	1,577,510	4,402,530	2.7	15.7
Oats - - -	766,220	6,062,130	7.9	17.3
Colza - - -	94,500	440,770	4.7	12.0
Flax (seed) -	51,520	33,360	0.6	—

CROPS IN ITALY.

According to the reports for July and August published in the *Rivista Meteorico-Agraria* by the Ministry of Agriculture, the condition of the wheat, forage, and rice crops was generally satisfactory, and maize and hemp were particularly promising, although in some districts rain was badly wanted.

Vines and olives were doing well.

CROPS IN NOVA SCOTIA.

In the crop report issued by the Nova Scotian Agricultural Department in July last, the general outlook for the present season was stated to be of the most encouraging character. A larger acreage of land is under cultivation this year than usual; the potato crop and all root crops promised an abundant yield; and the hay, as well as oats and grain crops are also expected to be fully up to, if not above, the average. The fruit crop in the Annapolis and Cornwallis valleys was expected to be a good one, but in other sections of the province the apple crop was regarded as a little below the average.

CROPS IN MANITOBA.

The bulletin published by the Manitoban Board of Agriculture in June last gave the estimated acreage under the principal crops in the present year.* The area under wheat was put at 1,629,995 acres, as compared with 1,488,232 acres in 1898, and 1,290,882 acres in the preceding year. Oats, barley, and flax also showed an increased acreage, which was stated to be largely due to the increased number of farmers now in the province, there being about 2,500 more than at the same time last year. In all parts of Manitoba

*According to a later bulletin the estimated yield of the cereal crops is as follows:—Wheat, 33,504,766 bushels; oats, 23,003,126 bushels; barley, 3,532,972 bushels; and rye, 65,626 bushels.

the time of seeding was about three weeks later than usual, but reports indicated quick germination, and in all cases a remarkable growth since seeding, so that general satisfaction is expressed regarding crop prospects.

With regard to the dairying prospects, the season opened up very late, and was cold and backward. Feed was scarce, and there was no grass for pasturage until the first week in June, after which it was abundant. The prospects for cheese and butter are, however, said to be good.

CROPS IN ONTARIO.

The official estimated yield of the principal crops grown in the province of Ontario in 1899 was issued on the 1st August last. The area under winter wheat, amounting to 1,049,691 acres, was nearly 150,000 acres over the average of the previous sixteen years; but the yield (14,201,314 bushels) was more than four million bushels below the corresponding average. The yield per acre was only thirteen-and-a-half bushels in 1899, whereas it was twenty-four bushels in 1898. The spring wheat crop produced 7,087,977 bushels on 398,726 acres, or 17·8 bushels per acre. The corresponding average figures for the years 1882-1898 were 7,259,297 bushels, and 474,432 acres, or 15·3 bushels per acre. The total estimated wheat crop therefore amounted to nearly 21,290,000 bushels. The acreage under barley in 1899 was very much below the average, viz.—490,374 acres, compared with 630,376 acres. The total yield was less—14,622,922 bushels, compared with 16,235,295 bushels; but the crop of 29·8 bushels per acre in 1899 was heavier than the average by exactly four bushels. Oats were sown on 2,363,778 acres, and produced 89,542,162 bushels, or 37·9 bushels per acre. The corresponding area for the period already indicated was 1,904,717 acres, and the yield 65,792,653 bushels, or 34·5 bushels per acre. The acreage under rye in 1899 was 137,824 acres, which produced 2,271,382 bushels, or sixteen and a-half bushels per acre. In the period 1882-1898 the average was 111,174 acres, and 1,796,013 bushels, or 16·2 bushels per acre.

PARLIAMENTARY PUBLICATIONS.

Board of Agriculture.—Report on the Results of Investigations into Cheddar Cheese-making. [C. 9374.] Price 1s. 7d.

This volume is a special report prepared by Mr. F. J. Lloyd, F.C.S., F.I.C., relating to the results of a series of investigations into the various processes connected with the manufacture of Cheddar cheese. These investigations were undertaken by the Bath and West and Southern Counties Society, at the suggestion of the Board of Agriculture, and extended over a period of eight years.

After briefly reviewing the various systems of making Cheddar cheese, Mr. Lloyd furnishes a detailed account of the methods of investigation adopted by him, and of the results of his researches. The subjects of inquiry included, *inter alia*, the variations in quality of milk from cows feeding in different pastures; the causes of defects in cheese-making arising from the quality of the milk, changes in temperature etc.; and the effect of temperature on the ripening of cheese. An important chapter, dealing with the bacteriological aspects of the investigations, contains observations on the use of pure cultures as starters in cheese-making, and on certain bacteria which are the exciting agents of various taints in cheese. The report concludes with some remarks on the conditions essential to the manufacture of Cheddar cheese of high quality.

Board of Agriculture Annual Report on the Distribution of Grants for Agricultural Education and Research in the year 1898-99 [C.—9431]. Price 8½d.

The total amount distributed by the Board in Grants for Agricultural Education and Research in the year 1898-99 amounted to £7,350, exclusive of expenditure incurred in the

inspection of the educational and experimental work of the several institutions aided, and in inspecting and reporting on the work of certain county councils. By far the larger portion of the funds distributed consisted of subventions of a general character to eight collegiate centres of Agricultural Education in England and Wales. Grants of a subsidiary character were made to certain institutions providing facilities for dairy instruction not available at the aided colleges; certain sums were also awarded in aid of the cost of specific experiments undertaken, under arrangement with the Board, by agricultural societies and associations. The most important payments of this type were made to complete the prolonged investigations into the conditions of Cheddar cheesemaking undertaken by the Bath and West of England and Southern Counties Society, whereof a full report has been separately prepared and presented to Parliament in the course of the recent session (C. 9374).

Reference is made in the report to the recent foundation of a chair of Agriculture at the University of Cambridge and the Board express satisfaction at the action the University has taken in thus establishing, for a period of ten years, a Department of Agriculture under the direction of a Professor.

In the appendix to the report statements are furnished respecting the educational work done during the year by the subsidised colleges and dairy institutes. Summaries are also given of some of the principal experiments carried out under the supervision of these institutions and of the societies referred to below. The Board express satisfaction at the increasing development of interest in instruction by experiments and demonstrations. In many instances the experimental plots are reported to have been visited by large numbers of agriculturists to whom explanations were offered either by lectures or by the issue of printed reports, of the main facts to be deduced from the investigations in progress.

As an indication of the diversified nature of their experimental and research work in agriculture, carried out in England and Wales during the year 1898-99, it is interesting to note that the investigations of which summaries are given

in the appendix include a rotation experiment conducted on uniform lines in different parts of the country; a number of manurial experiments on grass, and on root and grain crops; and an experiment, now in its second year, to determine the influence of manures applied to poor pastures carrying sheep on the resultant production of mutton. Among other inquiries noticed in this portion of the appendix are experiments in the economic feeding of cattle and swine; in the treatment of finger and toe; in the eradication of charlock; in the cultivation and manipulation of hops; and in the manufacture of cider.

The following is the list of the grants awarded by the Board in 1898-99 :—

Institutions aided.	Work.	Grant 1898-99.
University College of North Wales, Bangor -	Collegiate centre -	£ 800
Do. do. do. -	College farm -	200
Durham College of Science, Newcastle-on-Tyne -	Collegiate centre -	800
Do. do. do. -	College farm -	200
University College of Wales, Aberystwith -	Collegiate centre -	800
Reading College -	Collegiate centre -	800
South-Eastern Agricultural College, Wye -	Collegiate centre -	800
Yorkshire College, Leeds -	Collegiate centre -	700
Cambridge and Counties Agricultural Education Committee -	Collegiate centre -	500
University College, Nottingham -	Collegiate centre -	400
„ Midland Dairy Institute -	Dairy instruction -	300
British Dairy Institute, Reading -	Dairy instruction -	300
Eastern Counties Dairy Institute, Ipswich -	Dairy instruction -	300
Bath and West and Southern Counties Society	Field experiments -	50
Do. do. do. -	Cider experiments -	50
Do. do. do. -	Cheddarcheese research -	200
Do. do. do. -	Do. (Special Report) -	50
Agricultural Research Association, Aberdeen -	Agricultural experi- ments -	100.

Provision for Old Age by Government Action in certain European Countries. [C. 9414.] Price 3d.

A report on “Provision for Old Age by Government Action in Certain European Countries” has been issued by the Labour Department of the Board of Trade. It describes the nature, and gives, so far as possible, the results of the working in each country of the laws under which provision

for old age is either encouraged or declared obligatory. The countries dealt with are Russia, Norway, Sweden, Denmark, Germany, Holland, Belgium, France, Italy, Austria, and Roumania. Of these eleven countries, Germany and Denmark alone can be said to have adopted a general system of pensions or relief in old age.

The German Law of 1889 (in operation since January 1st, 1891) embraces practically all wage-workers (other than those entitled to pensions in their capacity of public servants) above the age of 16 and earning not more than £100 per annum. It fixes the scale of contributions to be paid by them and by their employers, and places the responsibility for the payment of these contributions on the latter, whom, however, it allows to deduct half the amount from wages. It provides for the addition of a sum of £2 10s. per annum, at the cost of the State, to each pension acquired under the law. The old-age pension becomes payable after the completion of the 70th year, and is given simply for old age, irrespective of physical fitness; while the invalidity pension becomes payable after the completion of 235 weeks of contribution, to any person who, irrespective of age, is permanently unable to earn one-third of his or her previous wages. In the year 1897 (the most recent for which statistics have been published) over 400,000 persons drew pensions amounting to no less than £2,750,531, of which £1,079,823 was provided by the State. Of these amounts about one-half was expended on invalidity and one-half on old-age pensions. It has been officially estimated that 12,144,530 persons out of 52,279,901, representing the total population of the German Empire (census of December 2nd, 1895), are liable to insurance under the law.

In Denmark the system adopted is very different, the Law of 1891 (in operation since July 1st, 1892) providing for a special form of old-age relief to any necessitous person of good character who is over sixty years of age. There are no direct contributions by the recipient, and the amount of the pension is not fixed by the law, though it must be sufficient for the needs of the applicant and his family. Receipt of this relief does not impose electoral disabilities. In 1896

36,246 persons, with 14,223 dependents, were receiving pensions in Denmark under this law to the amount of £216,317, of which, roughly, half was paid by the State and half by the Communes.

The Report mentions a system of compulsory subscription to old-age relief funds in force in Iceland under a law of 1890, but states that no relief has yet been paid under that law.

Report of the Progress of the Ordnance Survey to the 31st March, 1899. [C. 9385.] Price 3s. 2½d.

According to this report the actual work of revising the original $\frac{1}{2500}$ maps of England and Wales was not begun till 1894. Since that year the following counties have been resurveyed :—Bucks, Cheshire, Durham, Essex, Flint Hants, Herts, Kent, Middlesex, Northumberland, Surrey Sussex, and Westmoreland. The revision of the following counties is in progress :—Anglesey, Berks, Carnarvon, Cumberland, Denbigh, Derby, Glamorgan, Monmouth Northampton, Notts, Oxford, Stafford, and Wilts. During the same period $\frac{1}{2500}$ maps have been prepared of London, Plymouth, and the Tyneside district, and also of all towns in the districts under revision. The total area of which maps have been published is 13,988 square miles, of which 4,752 square miles were published in the year 1898-99.

The 6 in. to the mile maps of the revised counties of England and Wales are, as a rule, being reduced from the revised maps on the $\frac{1}{2500}$ scale, and are published by heliozincography. In uncultivated districts the revision is made direct on the original 6 in. maps. The total area published is 10,010 square miles, of which 6,222 square miles have been published during the year ended March 31st last.

In accordance with a recommendation of the Departmental Committee which reported on the survey of 1892, the Treasury in 1893 sanctioned the principle that the 1 inch map should be revised every fifteen years independently of the revision of the maps of Great Britain on larger scales. The field work of the revision was begun in 1893. Since that year, th

whole of England and Wales has been revised on the ground. The revised maps of 54,594 square miles have been engraved and published, of which 26,289 square miles have been published during the year. This revision will be completed this year. Various changes have been introduced during the revision with a view of adding to the value of the maps for military purposes, and for the use of travellers, without diminishing their value for civil purposes. The general result to be obtained by the revision is that in 1899 there will for the first time be available to the public a 1 inch outline map of the whole of the country, prepared on one uniform system, and with its principal details nearly up-to-date.

The revision of the $\frac{1}{25000}$ maps of Scotland began in 1894, and the following counties have been completed: Argyll, Ayr, Bute, Berwick, Dumbarton, Dumfries, Lanark, Linlithgow, Peebles, Renfrew, Roxburgh, Selkirk, and Stirling. The survey of the counties of Aberdeen, Clackmannan, and Perth is in progress of revision. Revised maps of Glasgow on the $\frac{1}{25000}$ scale have also been prepared. The revision of the 1 inch outline map has been completed.

The resurvey of Ireland on the $\frac{1}{25000}$ scale has been delayed owing to the extreme closeness of the detail in parts of some counties. There are many plans on which the enclosures are of less average area than one acre. The counties of Clare, Kerry, Mayo, and the southern half of Roscommon have been completed. The work is proceeding in Cork, Galway, Kilkenny, and Limerick. Revision of the Irish 1 inch scale map on the same system as in Great Britain has been begun.

The process of photozincography, which was invented at the office of the Ordnance Survey in 1859, besides being used extensively in the preparation of the Ordnance Survey maps, has been applied to the reproduction of a series of fac-similes of the most valuable of the national MSS., by authority of the Treasury.

*Royal Commission on Horse Breeding, Seventh Report.—**[C. 9487.] Price 2½d.*

The Commissioners report that the number of stallions presented for competition in the district classes continues satisfactory, and the quality distinctly higher than at some of the former shows. The desirability of limiting the age of stallions, and preventing those which are unfruitful from competing for Queen's Premiums, has been a subject of consideration, and the Commissioners have deemed it desirable to formulate the following new regulation, viz:—That no stallion over 20 years of age, or any stallion whose average percentage of foals for two seasons does not amount to at least 40 per cent., should be eligible to compete for a Queen's Premium. The question of improving the quality of the mares in this country is one of great importance, and continues to have the careful consideration of the Commissioners. Upon this question a circular letter has been addressed to the masters and secretaries of hunts throughout the country, asking if they could see their way to offering at local shows prizes or premiums for brood mares the property of residents in their respective districts, covered by a Queen's Premium stallion. From the answers received it would appear that something is being done in this way, though many, while fully alive to the importance of the object, regret that they are unable, principally from lack of funds, to adopt the suggestion.

Representations were made to the Commissioners on behalf of the British Association through Mr. Francis Galton, D.C.L., F.R.S., to have the stallions exhibited at the recent show severally photographed, measured, etc. This was done, and a report on the subject by Mr. Galton is appended to the Commission's Report.

*Glanders Committee.—Report of the Departmental Committee**[C.—9397.] Price 2d.*

This committee was appointed on the 7th February, 1899, by the President of the Board of Agriculture, to inquire into the working of the Diseases of Animals Acts in

so far as they relate to Glanders, and to consider whether any more effective measures could with advantage be taken to prevent the spread of that disease. The inquiry was limited to the examination of the efficacy of the existing system of dealing with glanders, and to the consideration of whether any, and if so what, alteration was desirable.

The committee recommend, *inter alia*, that the Board of Agriculture should exercise a more extended supervision over the working of the Glanders or Farcy Order, that it should be obligatory for veterinary surgeons and occupiers or owners of knackers' yards to notify cases of diseases, that horses which react to the mallein test should be considered as possible sources of infection, and that the slaughter of all animals showing "clinical" symptoms of glanders should be made compulsory.

The committee make certain recommendations as to compensation, and also suggest that the Board of Agriculture should conduct experiments with regard to the use and influence of mallein.

PRICES OF LIVE STOCK.

RETURNED UNDER THE WEIGHING OF CATTLE ACT.

Returns of prices furnished to the Board of Agriculture from the places scheduled under the Markets and Fairs (Weighing of Cattle) Act are available for the second quarter of the current year. During that period 319,826 cattle, 1,200,077 sheep, and 106,310 swine were returned as entering the markets at the 21 places from which particulars are received under the statute. The numbers weighed and priced, with the comparative figures for the corresponding quarter of 1898, are given in the following statement:—

Animals.	2nd Quarter, 1899.	2nd Quarter, 1898.
CATTLE:	No.	No.
Entering markets - - - -	319,826	323,369
Weighed - - - -	36,305	33,484
Prices returned - - - -	32,498	30,656
Prices returned with quality distinguished - - - -	25,962	23,888
SHEEP:		
Entering markets - - - -	1,200,077	1,200,032
Weighed - - - -	14,124	16,609
Prices returned with quality distinguished - - - -	12,045	13,342
SWINE:		
Entering markets - - - -	106,310	76,760
Weighed - - - -	713	298
Prices returned with quality distinguished - - - -	601	251

While the number of cattle entering the markets was slightly less than during the same period last year, the numbers weighed and priced were larger. The number of sheep exposed for sale was curiously similar in the two quarters above compared, but the proportion weighed was not only still very small, but showed a decrease from last year.

Ashford, Norwich, and Salford are still conspicuous as the only places from whence no returns of price are received. There was no place at which the weighbridge was absolutely unused during the three months, as has sometimes happened, although at Birmingham, Bristol, Lincoln, and York the demands upon it were quite inconsiderable.

Scotland continues to be far in advance of England as regards the weighing of live stock—20 per cent. of the cattle entering the markets north of the Border being weighed and priced, as compared with only 4 per cent. in the South.

The twelve places, six in England and six in Scotland, which supply sufficient data for the compilation of price records appear in the following table with the average price per stone and per cwt. for each quality of fat cattle:—

PLACES.	INFERIOR or Third Quality.			GOOD or Second Quality.			PRIME or First Quality.		
	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.
Carlisle - -	427	s. d. 3 4	s. d. 26 8	401	s. d. 3 10½	s. d. 30 10	1,175	s. d. 4 3½	s. d. 34 4
Leeds - -	6	3 6	28 0	56	3 6¾	28 6	427	4 0¼	32 2
Liverpool - -	47	3 1¾	25 2	132	3 9½	30 4	646	4 3¼	34 2
London - -	13	3 5½	27 6	233	4 4¼	34 10	1,019	4 9½	38 4
Newcastle - -	8	3 6½	28 4	68	4 1	32 8	1,005	4 7½	37 0
Shrewsbury - -	42	3 8	29 4	108	4 1	32 8	228	4 4½	35 0
Aberdeen - -	1,245	3 3¾	26 6	2,453	4 1¼	32 10	2,174	4 6½	36 4
Dundee - -	126	3 7½	28 10	1,240	4 1	32 8	934	4 4	34 8
Edinburgh - -	—	—	—	2,916	4 4¾	35 2	399	4 5¾	35 10
Falkirk - -	13	3 11¼	31 6	333	4 3½	34 4	597	4 5½	35 3
Glasgow - -	333	4 0½	32 4	894	4 2½	33 8	2,084	4 6	36 0
Perth - -	8	3 7½	28 10	115	4 0½	32 4	424	4 5½	35 3

The prices for prime cattle ranged from 4s. 0¼d. per stone (32s. 2d. per cwt.) at Leeds to 4s. 9½d. per stone (38s. 4d. per cwt.) in London, and in the case of second quality beasts Leeds again furnished the lowest quotation, 3s. 6¾d. per stone (28s. 6d. per cwt.), and Edinburgh with an average of 4s. 4¾d. per stone (35s. 2d. per cwt.) exceeded by a fraction the return for London.

The quotations at each of these places are compared with those recorded for the same markets last year as follows:—

PLACES.	INFERIOR OF Third Quality.		GOOD OF Second Quality.		PRIME OF First Quality.	
	1899.	1898.	1899.	1898.	1899.	1898.
	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.
Carlisle - - -	26 8	25 6	30 10	29 10	34 4	32 10
Leeds - - -	28 0	28 0	28 6	29 0	32 2	32 0
Liverpool - - -	25 2	24 2	30 4	28 0	34 2	32 8
London - - -	27 6	23 8	34 10	32 10	38 4	36 6
Newcastle - - -	28 4	25 8	32 8	30 0	37 0	32 10
Shrewsbury - - -	29 4	—	32 2	—	35 0	—
Aberdeen - - -	26 6	24 2	32 10	31 8	36 4	34 4
Dundee - - -	28 10	26 8	32 8	30 10	34 8	33 4
Edinburgh - - -	—	—	35 2	32 10	35 10	33 6
Falkirk - - -	31 6	29 4	34 4	32 4	35 8	34 0
Glasgow - - -	32 4	31 2	33 8	32 2	36 0	34 2
Perth - - -	28 10	30 0	32 4	32 2	35 8	34 8

This statement clearly indicates the higher range of values which prevailed this year during the three months under review.

Continuing, moreover, the series of monthly quotations which were given for the first time in the last number of the *Journal*, the improvement in prices is shown to have been

MONTHS.	AVERAGE PRICES.			
	GOOD or Second Quality.		PRIME or First Quality.	
	Per Stone.	Per Cwt.	Per Stone.	Per Cwt.
	s. d.	s. d.	s. d.	s. d.
April - - -	4 1 $\frac{3}{4}$	33 2	4 4 $\frac{3}{4}$	35 2
May - - -	4 2	33 4	4 5 $\frac{1}{4}$	35 6
June - - -	4 4 $\frac{3}{4}$	35 2	4 7 $\frac{1}{2}$	37 0

progressive, the higher quarterly averages being evidently attributable mainly to the course of trade in the month of June.

These figures, it may be observed, are, as previously explained, based upon the actual prices realised by the cattle of first and second quality weighed and priced at the twelve places from which sufficient returns are received to form the basis of calculation, and may be therefore not unfairly taken as an index of the general range of values. The rise of $2\frac{3}{4}$ d. per stone for prime. and of 3d. per stone for second quality beasts, which thus appears to have taken place from April to June followed upon the slightly rising tendency noticed in the last volume of the *Journal* as apparent during the first three months of the year.

Transactions in which animals are sold at an agreed-on rate per stone, or per cwt., are still few and are quite insignificant in number south of the Tweed. Returns of prices realised in such cases during the quarter relate altogether to 3,606 fat cattle and 106 stores. Nearly half of the whole number were returned from Glasgow, the other markets represented in this category being Falkirk, Edinburgh, Dundee, London and Newcastle. The prices calculated from these actual sales by live weight ranged from 4s. $3\frac{3}{4}$ d. per stone at Dundee to 4s. $7\frac{3}{4}$ d. per stone in London for prime beasts, while for second quality cattle prices averaged about 4s. 2d. to 4s. 3d. per stone.

At Shrewsbury the practice of passing store cattle over the weighbridge seems to increase in favour, figures of the weights and prices of 3,147 animals of this class having been received during the quarter. The average prices returned were for first quality 4s. $4\frac{3}{4}$ d., for second quality 3s. $11\frac{3}{4}$ d., and for third quality 3s. $8\frac{3}{4}$ d. per stone. A small number of stores were also weighed at Glasgow, Edinburgh, and Dundee.

The usual table giving details of the stock of all descriptions entering and weighed at each of the scheduled markets is appended :—

Cattle, Sheep, and Swine, entering the Markets and Marts of the undermentioned Places, with the Number Weighed, as received from the Market Authorities in the **Second Quarter** of 1899, under the Markets and Fairs (Weighing of Cattle) Act, 1891 (54 & 55 Vict. c. 70).

PLACES.	Cattle.			Sheep.			Swine.		
	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.
ENGLAND.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Ashford - - -	3,409	94	—	31,102	31	—	5,479	—	—
Birmingham - -	10,242	3	3	23,444	—	—	47,213	—	—
Bristol - - -	15,188	24	24	32,870	—	—	—	—	—
Carlisle - - -	20,190	2,003	2,003	69,463	—	—	4,230	—	—
Leicester - - -	18,011	121	116	18,832	—	—	1,492	—	—
Leeds - - -	9,194	489	489	42,870	2,221	2,221	1,039	—	—
Lincoln - - -	2,405	3	3	18,450	—	—	3,181	—	—
Liverpool - - -	6,803	825	825	84,773	1,433	1,433	—	—	—
London - - -	17,005	2,588	1,265	157,885	1,902	82	—	—	—
Newcastle-upon-Tyne	23,471	1,081	1,081	76,850	—	—	9,420	522	522
Norwich - - -	34,136	97	—	70,060	—	—	8,153	—	—
Salford - - -	23,887	333	—	156,203	20	—	938	6	—
Shrewsbury - - -	15,827	5,000	3,525	19,839	—	—	7,566	—	—
Wakefield - - -	19,848	525	159	71,708	130	—	6,163	106	—
York - - -	17,837	8	8	26,165	10	10	—	—	—
SCOTLAND.									
Aberdeen - - -	14,646	5,872	5,872	63,109	6,207	6,207	4,201	—	—
Dundee - - -	5,014	2,371	2,319	7,641	1,770	1,736	670	—	—
Edinburgh - - -	19,744	7,026	*3,391	67,293	—	—	2,110	—	—
Falkirk - - -	3,718	943	943	1,739	—	—	23	—	—
Glasgow - - -	18,778	3,451	3,389	76,694	68	24	1,893	—	—
Perth - - -	20,473	3,448	*547	83,087	332	332	2,539	79	79
TOTAL for ENGLAND	237,453	13,194	9,501	900,514	5,747	3,746	94,874	634	522
TOTAL for SCOTLAND	82,373	23,111	*16,461	299,563	8,377	8,299	11,436	79	79
Total - -	319,826	36,305	*25,962	1,200,077	14,124	12,045	106,310	713	601

*Prices for 3,335 cattle in addition to the above were quoted from Edinburgh and for 2,901 cattle from Perth, but without distinguishing the quality.

PRICES OF MEAT, CORN, AND DAIRY PRODUCE.

AVERAGE PRICES of DEAD MEAT, per Stone of 8 lbs., at the LONDON CENTRAL MEAT MARKET, during the Second Quarter of 1899, and during the Months of June, July, and August, 1899.

(Compiled from the prices quoted weekly in the Meat Trades Journal.)

DESCRIPTION.	2ND QUARTER 1899.				JUNE, 1899.				JULY, 1899.				AUGUST, 1899.			
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
BEEF :—																
Scotch, short sides - - - -	4	2	0	4	5	4	5	0	4	6	0	4	4	0	4	8
„ long sides - - - -	3	10	„	4	1	4	0	„	4	2	—	—	—	—	—	—
English - - - -	3	10	„	4	0	3	10	„	4	2	3	11	„	4	2	3
Cows and Bulls - - - -	2	0	„	2	10	1	11	„	2	8	1	11	„	2	8	2
American Birkenhead killed	3	5	„	3	7	3	4	„	3	7	3	5	„	3	8	3
„ Deptford killed - - -	3	5	„	3	8	3	5	„	3	7	3	6	„	3	9	3
Argentine „ „ - - -	2	9	„	3	3	2	7	„	3	1	2	11	„	3	3	3
American Refrig. hind-quarters -	3	6	„	3	9	3	7	„	3	9	3	4	„	3	7	3
„ „ fore-quarters - -	2	4	„	2	6	2	0	„	2	2	1	10	„	2	0	2
Australian, Frozen hind-quarters -	2	4	„	2	5	1	11	„	2	1	1	9	„	1	11	2
„ „ fore-quarters - -	1	10	„	1	11	1	6	„	1	8	1	1	„	1	3	1
New Zealand „ hind-quarters -	2	4	„	2	8	2	0	„	2	2	1	11	„	2	0	2
„ „ fore-quarters - -	1	10	„	2	0	1	7	„	1	9	1	2	„	1	4	1
MUTTON :—																
Scotch, Prime - - - -	4	10	„	5	4	5	0	„	5	7	5	0	„	5	6	4
English, Prime - - - -	4	6	„	4	11	4	5	„	5	0	4	7	„	5	1	4
Ewes - - - -	3	3	„	3	7	2	11	„	3	4	3	4	„	3	8	3
Continental - - - -	4	6	„	4	8	4	3	„	4	7	4	3	„	4	7	3
River Plate, Town killed - - -	3	1	„	3	5	2	7	„	3	0	3	5	„	3	7	3
New Zealand, Frozen - - -	2	4	„	2	11	2	1	„	2	11	1	8	„	2	11	1
Australian, Frozen - - -	2	2	„	2	4	1	9	„	2	0	1	7	„	1	9	1
River Plate, Frozen - - -	2	2	„	2	4	1	10	„	2	0	1	8	„	1	9	—
LAMB :—																
English - - - -	5	6	„	6	9	5	0	„	6	1	4	11	„	5	9	4
New Zealand, Frozen - - -	3	2	„	3	7	3	5	„	3	10	3	4	„	3	8	2
VEAL :—																
English - - - -	4	4	„	4	9	4	2	„	4	6	4	0	„	4	4	4
Foreign - - - -	3	9	„	4	2	3	8	„	4	0	3	6	„	3	10	3
PORK :—																
English, best - - - -	3	7	„	3	11	3	2	„	3	6	3	1	„	3	6	3
„ secondary - - - -	3	1	„	3	6	2	10	„	3	2	2	7	„	3	0	2
Foreign - - - -	3	1	„	3	6	2	10	„	3	2	2	7	„	3	0	2

AVERAGE WHOLESALE PRICES of CATTLE and SHEEP, per Stone of 8 lbs., sinking the offal, at the METROPOLITAN CATTLE MARKET, during the undermentioned Quarters of 1898 and 1899.

PERIOD.	CATTLE.			SHEEP.		
	Inferior.	Second.	First.	Inferior.	Second.	First.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
2nd Quarter, 1898	2 4	3 7	4 2	2 10	4 5	5 2
3rd Quarter „	2 4	3 8	4 3	3 1	4 8	5 5
4th Quarter „	2 5	3 9	4 5	3 3	4 10	5 7
1st Quarter, 1899	2 6	3 11	4 6	3 5	4 11	5 8
2nd Quarter „	2 7	3 11	4 6	3 4	5 1	5 9

AVERAGE WHOLESALE PRICES OF BEEF and MUTTON, per Stone of 8 lbs., by the Carcase, at LIVERPOOL and GLASGOW, during the under-mentioned Quarters of 1898 and 1899.

PERIOD.	LIVERPOOL.*				GLASGOW.†			
	BEEF.		MUTTON.		BEEF.		MUTTON.	
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
2nd Quarter, 1898	2 4	to 3 2	3 8	to 4 10	2 8	to 3 6	3 4	to 4 8
3rd Quarter „	2 4	„ 3 6	3 2	„ 4 8	2 4	„ 3 6	3 4	„ 4 6
4th Quarter „	2 4	„ 3 8	3 4	„ 4 8	2 8	„ 3 10	3 0	„ 4 6
1st Quarter, 1899	2 6	„ 3 9	4 2	„ 4 10	2 10	„ 3 8	3 8	„ 4 4
2nd Quarter „	2 4	„ 3 8	4 0	„ 5 4	3 0	„ 4 2	4 4	„ 5 4

* Compiled from information furnished by the Medical Officer of Health, Liverpool. The prices quoted are for Carcases of Animals *slaughtered at the Liverpool Abattoir*, and do not apply to Imported Meat.

† Compiled from information furnished by the Principal of the Veterinary College, Glasgow.

BERLIN MARKET.

AVERAGE PRICES of CATTLE and SHEEP (First Quality Dead Weight) in the BERLIN CATTLE MARKET in the under-mentioned Months of 1899.

MONTHS.	CATTLE.		SHEEP.	
	Per Cwt.		Per Cwt.	
1899.	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>
June - - - -	61 4	to 65 8	60 4	to 62 10
July - - - -	62 9	„ 67 2	61 11	„ 63 11
August - - - -	63 5	„ 67 8	64 5	„ 66 5

NOTE.—The above prices have been compiled from the weekly returns published in the *Deutsche Landwirtschaftliche Presse*.

PARIS MARKET.

AVERAGE PRICES of CATTLE, SHEEP, and SWINE (Medium Quality) in the PARIS CATTLE MARKET in the under-mentioned Months of 1899.

MONTHS.	OXEN.	CALVES.	SHEEP.	PIGS.
	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.
LIVE WEIGHT.				
1899.	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>
June - - - -	30 9	39 4	33 8	41 10
July - - - -	30 3	38 2	33 8	42 7
August - - - -	29 10	37 2	33 5	42 0
DEAD WEIGHT.				
1899.	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>
June - - - -	51 2	67 9	69 1	60 3
July - - - -	50 4	63 9	67 5	61 1
August - - - -	49 7	62 1	66 6	59 7

NOTE.—The above prices have been compiled from the weekly returns published in the *Journal d'Agriculture Pratique*.

CHICAGO.

PRICES of CATTLE at CHICAGO per Cwt. (Live Weight) in the under-mentioned Months of 1899.

Months.	Good Dressed Beef and Shipping Steers.		Export Cattle.		Extra Prime Cattle.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1899.						
June- . .	23 8	to 25 0	23 3	to 25 1	25 10	to 26 5
July - . .	24 6	„ 25 9	23 10	„ 26 4	26 4	„ 27 4
August - .	25 5	„ 27 6	25 2	„ 28 6	28 6	„ 29 11

Compiled from the Live Stock Reports issued by Messrs. Clay, Robinson, and Co. of the Union Stock Yards, Chicago, Illinois.

AVERAGE VALUES, per Cwt., of various Kinds of DEAD MEAT Imported into the United Kingdom from FOREIGN COUNTRIES and BRITISH POSSESSIONS in the under-mentioned Quarters of 1898 and 1899.

(Computed from the Trade and Navigation Accounts.)

PERIOD.	BEEF.		MUTTON.	PORK.		BACON.	HAMS
	Fresh.	Salted.	Fresh.	Fresh.	Salted.		
2nd Quarter, 1898 -	s. d. 39 3	s. d. 26 9	s. d. 29 8	s. d. 41 10	s. d. 22 9	s. d. 36 5	s. d. 39 2
3rd Quarter „ -	37 8	26 1	30 0	41 9	20 5	37 1	39 1
4th Quarter „ -	35 3	25 10	29 8	41 1	23 7	36 8	40 2
1st Quarter, 1899 -	39 4	26 1	30 6	40 10	24 5	34 3	38 7
2nd Quarter „ -	39 6	26 6	32 6	41 9	20 2	35 4	38 9

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels,* computed from the Weekly Averages of Corn Returns from the 196 Returning Markets of ENGLAND AND WALES, pursuant to the Corn Returns Act, 1882, together with the QUANTITIES returned as sold at such Markets, in the under-noted periods of the Years 1899, 1898, and 1897.

QUARTER ENDED	PRICES.			QUANTITIES.		
	1899.	1898.	1897.	1899.	1898.	1897.
Wheat.						
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
Lady Day -	26 3	35 1	29 7	868,579	699,657	619,679
Midsummer -	25 1	41 5	27 6	994,293	557,504	619,618
Michaelmas -	—	32 8	30 4	—	308,279	635,698
Christmas -	—	27 2	33 3	—	1,036,975	881,566
Barley.						
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
Lady Day -	27 1	27 9	24 0	830,398	902,452	784,713
Midsummer -	24 6	26 10	21 4	92,648	47,621	78,488
Michaelmas -	—	25 10	21 6	—	99,743	118,875
Christmas -	—	28 2	27 0	—	2,603,841	2,275,111
Oats.						
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
Lady Day -	16 11	17 5	16 4	251,841	226,150	194,193
Midsummer -	17 6	19 10	17 3	137,834	93,475	79,707
Michaelmas -	—	19 7	17 10	—	78,787	75,824
Christmas -	—	16 11	16 5	—	289,652	200,710

* Section 8 of the Corn Returns Act, 1882, provides that where returns of purchases of British Corn are made to the local inspector of Corn Returns in any other measure than the imperial bushel or by weight or by a weighed measure that officer shall convert such returns into the imperial bushel, and in the case of weight or weighed measure the conversion is to be made at the rate of 60 imperial pounds for every bushel of wheat, 50 imperial pounds for every bushel of barley, and 39 imperial pounds for every bushel of oats.

CORN PRICES :—HARVEST YEAR.

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Weekly Averages of Corn Returns from the 196 Returning Markets, together with the QUANTITIES returned as sold at such Markets during each of the Harvest Years ending 31st August 1890 to 1899.

HARVEST YEARS.	PRICES.			QUANTITIES.		
	Wheat.	Barley.	Oats.	Wheat.	Barley.	Oats.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
1889-90 -	31 2	28 10	18 6	3,289,806	3,281,141	558,053
1890-91 -	35 5	28 0	19 1	3,496,788	3,659,382	602,887
1891-92 -	33 4	27 2	20 8	3,267,038	3,260,327	488,830
1892-93 -	26 8	24 10	18 9	2,676,227	3,383,094	547,412
1893-94 -	25 5	26 5	18 4	2,087,062	2,876,977	542,425
1894-95 -	21 5	21 5	14 8	2,180,959	3,136,415	693,121
1895-96 -	24 10	22 4	14 1	1,640,943	3,366,364	672,547
1896-97 -	28 8	23 2	16 9	2,597,268	3,200,612	551,912
1897-98 -	36 2	26 11	18 3	2,534,224	3,339,842	599,666
1898-99 -	26 0	26 1	17 3	3,498,515	3,629,760	777,676

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Returns received under the Corn Returns Act, 1882, in each of the under-mentioned Weeks in 1899, and in the corresponding Weeks in 1898 and 1897.

Weeks ended (<i>in 1899</i>).	Wheat.			Barley.			Oats.		
	1899.	1898.	1897.	1899.	1898.	1897.	1899.	1898.	1897.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Jan. 7 -	27 0	34 11	31 1	28 3	27 9	25 5	17 0	16 10	16 3
„ 14 -	27 2	35 0	31 8	28 2	27 8	24 10	17 1	17 4	16 5
„ 21 -	27 0	34 11	31 7	27 11	27 10	25 5	17 1	17 5	16 6
„ 28 -	26 7	34 6	31 3	27 9	27 8	24 7	17 0	17 2	16 8
Feb. 4 -	26 6	34 10	30 7	27 2	28 0	24 10	17 0	17 6	16 7
„ 11 -	26 8	35 1	29 8	27 2	27 8	24 8	17 0	17 5	16 6
„ 18 -	26 0	35 0	28 11	26 10	27 11	23 9	16 11	17 8	16 5
„ 25 -	25 7	35 5	28 2	26 7	27 6	23 8	16 11	17 10	16 3
Mar. 4 -	25 8	35 10	28 3	26 7	28 0	23 0	17 0	17 11	16 3
„ 11 -	25 10	35 8	27 11	26 7	27 10	22 11	16 11	17 9	16 2
„ 18 -	25 10	35 6	27 11	26 3	28 0	22 8	16 10	17 10	16 2
„ 25 -	25 4	35 4	27 9	26 8	28 6	22 5	17 0	17 8	16 3
Apl. 1 -	24 11	35 3	27 10	26 2	27 11	22 3	16 11	17 10	16 3
„ 8 -	24 7	35 2	27 8	25 1	27 0	22 7	16 11	17 11	16 6
„ 15 -	24 6	35 3	27 0	25 7	28 0	23 0	16 10	18 2	16 3
„ 22 -	24 8	36 1	26 6	25 2	28 3	20 7	17 1	18 4	16 7
„ 29 -	25 0	38 4	27 9	25 10	27 10	20 5	17 5	18 11	17 3
May 6 -	25 3	42 4	28 4	24 5	27 8	21 5	17 6	20 4	16 11
„ 13 -	25 4	45 11	27 11	23 11	27 1	20 2	17 9	21 1	17 7
„ 20 -	25 3	48 1	28 1	23 11	26 0	19 10	17 10	21 3	17 9
„ 27 -	25 2	47 9	28 2	23 8	26 5	21 3	17 8	21 5	17 10
June 3 -	25 4	46 3	27 10	24 4	26 10	20 8	18 1	21 0	17 9
„ 10 -	25 6	45 4	27 4	21 10	25 8	22 8	18 2	20 11	17 11
„ 17 -	25 7	42 4	27 0	23 1	26 1	23 9	17 10	20 5	18 0
„ 24 -	25 7	40 8	27 0	26 2	24 3	19 9	17 11	20 7	18 6
July 1 -	25 7	38 3	27 1	24 2	23 4	18 10	18 0	20 8	18 7
„ 8 -	25 7	36 10	27 4	21 9	25 0	17 4	18 1	20 5	18 8
„ 15 -	25 5	37 1	27 7	20 4	24 1	17 6	17 11	20 10	18 3
„ 22 -	25 5	38 1	28 1	21 10	25 0	18 10	18 0	20 10	18 11
„ 29 -	25 2	36 11	28 10	22 5	24 2	17 10	18 2	20 11	19 0
Aug. 5 -	24 10	35 7	29 5	20 9	26 11	17 9	18 0	20 7	18 11
„ 12 -	24 8	33 8	29 8	22 6	27 5	19 0	17 9	20 9	17 4
„ 19 -	24 7	32 7	30 4	26 11	24 4	19 2	17 4	19 11	17 2
„ 26 -	24 7	30 7	31 8	26 5	27 6	22 5	17 1	19 3	17 1
Sept. 2 -	25 0	28 1	33 7	25 10	27 8	25 11	16 7	18 11	17 0
„ 9 -	25 5	26 10	33 1	26 5	27 9	27 4	16 6	17 10	17 3
„ 16 -	25 4	25 7	33 10	27 1	26 10	28 11	16 2	16 10	17 0
„ 23 -		25 5	33 11		26 9	29 7		17 1	16 8
„ 30 -		25 9	33 4		27 0	29 10		16 7	16 4
Oct. 7 -		26 6	32 1		27 5	28 9		16 7	16 0
„ 14 -		26 6	31 10		27 11	28 3		16 6	16 1
„ 21 -		26 8	32 2		28 1	27 5		16 6	16 2
„ 28 -		27 4	32 10		28 8	27 5		16 8	16 0
Nov. 4 -		28 4	33 5		28 6	26 10		17 2	16 5
„ 11 -		28 4	34 0		28 7	26 3		17 5	16 3
„ 18 -		28 1	33 11		28 5	26 2		17 2	16 5
„ 25 -		27 9	33 8		28 4	25 9		17 1	16 8
Dec. 2 -		27 7	33 9		28 6	25 10		17 1	16 9
„ 9 -		27 6	33 9		28 6	26 0		17 3	16 6
„ 16 -		27 2	34 1		28 5	26 4		17 0	17 0
„ 23 -		26 9	34 4		28 6	26 11		17 0	17 0
„ 30 -		26 11	34 6		28 4	27 3		17 0	17 1

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in BELGIUM in the under-mentioned Months of 1899.

Month.	Wheat.	Barley.	Oats.
1899.	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
May - - - - -	28 8	24 0	19 5
June - - - - -	28 7	23 10	19 7
July - - - - -	28 8	23 4	20 4

The above prices have been compiled from the official monthly averages published in the *Moniteur Belge*.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in FRANCE, and ENGLAND and WALES in the under-mentioned Months of 1899.

MONTH.	FRANCE.	ENGLAND.
WHEAT.		
1899.	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>
June - - - - -	34 11	25 6
July - - - - -	34 4	25 5
August- - - - -	33 9	24 8
BARLEY.		
1899.	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>
June - - - - -	23 5	23 10
July - - - - -	23 5	22 1
August- - - - -	23 5	24 1
OATS.		
1899.	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>
June - - - - -	19 1	18 0
July - - - - -	19 5	18 0
August- - - - -	19 4	17 6

Note.—The prices of French grain have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*. The prices of British grain are official averages based on the weekly returns furnished under the Corn Returns Act, 1882.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER at the under-mentioned Markets in the under-mentioned Months of 1899.

Month.	London.	Paris.	Breslau.
WHEAT.			
1899.	Per Qr.	Per Qr.	Per Qr.
	s. d.	s. d.	s. d. s. d.
June - - - -	26 3	34 8	31 2 to 34 11
July - - - -	26 1	34 10	31 0 „ 34 9
August - - - -	25 2	34 5	30 9 „ 34 6
BARLEY.			
1899.	Per Qr.	Per Qr.	Per Qr.
	s. d.	s. d.	s. d. s. d.
June - - - -	23 6	25 5	22 0 to 25 5
July - - - -	20 9	24 8	22 0 „ 25 5
August - - - -	23 1	24 7	22 0 „ 25 5
OATS.			
1899.	Per Qr.	Per Qr.	Per Qr.
	s. d.	s. d.	s. d. s. d.
June - - - -	17 11	20 7	17 7 to 18 7
July - - - -	17 10	20 10	17 7 „ 18 7
August - - - -	17 11	20 9	17 5 „ 18 3

Note.—The London quotation represents the price of British corn as returned under the Corn Returns Act, 1882; the price of grain in Paris is the official average price of French grain in that city; the quotations shown for Breslau represent the prices of grain of good merchantable quality.

PRICES OF WOOL.

PRICES OF ENGLISH WOOL, per pack of 240 lbs., in the under-mentioned Months of 1899.

(Compiled from the Economist.)

DESCRIPTION.	June, 1899.	July, 1899.	August, 1899.
	£ s. £ s.	£ s. £ s.	£ s. £ s.
South Down - - -	7 10 to 10 0	7 10 to 10 16	7 10 to 11 0
Half-breds - - -	7 0 „ 8 0	6 12 „ 8 0	6 10 „ 8 0
Leicester - - -	7 0 „ 8 0	6 12 „ 7 12	6 10 „ 7 10
Kent Fleeces - - -	6 10 „ 7 10	6 2 „ 7 2	6 0 „ 7 0

MEAN WHOLESALE PRICES of BUTTER, MARGARINE, and
CHEESE in the under-mentioned Months of 1899.

(Compiled from the Grocer.)

DESCRIPTION.	June, 1899.			July, 1899.			August, 1899.		
	Per Cwt.			Per Cwt.			Per Cwt.		
BUTTER :	s.	d.	s. d.	s.	d.	s. a.	s.	d.	s. d.
Cork, 1sts - -	81	9	—	83	6	—	94	0	—
„ 2nds - -	79	3	—	82	0	—	90	0	—
„ 3rds - -	77	6	—	80	6	—	85	3	—
„ 4ths - -	71	6	—	74	0	—	77	0	—
Friesland -	85	0 to	87 0	88	6 to	91 6	102	0 to	105 0
Dutch Factories -	85	6,,	88 6	89	0,,	93 0	107	0,,	110 6
French Baskets -	88	6,,	93 0	92	6,,	97 0	108	6,,	118 0
Crocks and Firkins -	83	0,,	87 0	87	0,,	91 0	101	0,,	106 0
„ 2nds and 3rds	76	0,,	80 0	79	0,,	84 6	92	6,,	97 6
Danish and Swedish -	93	6,,	96 9	99	0,,	103 6	119	0,,	120 6
Finnish - -	85	0,,	89 6	88	6,,	95 0	103	6,,	112 0
Russian - -	83	0,,	87 0	86	6,,	92 6	92	0,,	104 0
Canadian and States -	63	6,,	87 6	67	0,,	92 0	84	6,,	105 0
Colonial, fine- -	—	—	—	—	—	—	110	0,,	120 0
„ good and inferior -	—	—	—	—	—	—	90	0,,	100 0
Fresh Rolls (Foreign) per doz. - -	8	9,,	12 0	9	6,,	13 0	10	9,,	14 9
MARGARINE :									
Margarine - -	30	0,,	54 0	30	0,,	54 0	30	6,,	54 6
Mixtures - -	56	6,,	74 6	58	0,,	76 0	58	6,,	77 0
CHEESE :									
Cheddar - -	50	0,,	74 0	50	0,,	71 0	42	6,,	68 0
Somerset - -	56	0,,	66 0	56	0,,	66 0	62	0,,	64 0
Cheshire - -	76	0,,	80 0	73	0,,	77 0	68	6,,	73 0
Wiltshire - -	58	0,,	64 0	56	0,,	62 6	57	0,,	61 6
Double Gloucester -	48	0,,	58 0	50	6,,	56 0	53	6,,	56 6
Derby - -	44	0,,	47 9	45	0,,	49 0	48	0,,	54 0

WEEKLY PRICES (WHOLESALE) of VEGETABLES and FRUIT
at COVENT GARDEN MARKET.(Compiled from the *Gardeners' Chronicle*.)

	Week ending							
	5th August.		12th August.		19th August.		26th August.	
VEGETABLE	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Artichokes, Globe, per dozen	1 6	to 2 0	1 6	to 2 0	1 6	to 2 0	1 6	to 2 0
Beans, English Dwarf, per sieve	1 6	„ 2 6	1 0	„ 2 0	1 6	„ 2 0	2 6	„ 3 0
Beans, Scarlet Runners, per bushel	3 0	„ 5 6	1 6	to 2 6	1 6	„ 2 6	2 6	„ 3 6
Beetroots, new, per dozen bunches	2 0	„ 3 0	2 0	„ 3 0	3 0	„ 4 0	3 0	„ 4 0
Cabbage, per tally	4 0	„ 7 0	4 0	„ 8 0	4 0	„ 3 0	4 0	„ 8 0
Cabbage, per dozen	1 0	„ 1 6	1 0	„ 2 0	1 0	„ 2 0	1 0	„ 2 0
Carrots, new English, per dozen bunches	0 9	„ 2 6	0 9	„ 2 6	1 0	„ 2 6	1 0	„ 2 0
Cauliflowers, per dozen	2 0	—	2 0	„ 3 0	1 6	„ 2 6	1 9	„ 2 0
Celery, new, per bundle	1 6	—	1 6	—	1 6	—	1 6	—
Cress, per dozen punnets	1 6	—	1 6	—	1 6	—	1 6	—
Cucumbers, per dozen	1 9	„ 3 0	1 6	„ 2 6	1 6	„ 3 0	1 6	„ 3 0
Cucumbers, ridge in pots	6 0	—	4 6	—	3 0	—	2 0	—
Endive, new French, per doz.	1 0	„ 1 6	2 6	—	1 9	„ 2 0	1 6	—
Garlic, new, per lb.	0 2	—	0 2	—	0 2	—	0 2	—
Horseradish, English, per bundle	3 6	—	3 6	—	3 0	„ 3 6	2 6	„ 3 0
Leeks, new, per doz. bunches	2 0	—	2 0	—	2 0	„ —	2 0	—
Lettuce, English, cabbage, per dozen	2 0	—	1 6	„ 2 0	1 6	„ 2 0	1 6	„ 2 0
Lettuce, Cos, per dozen	2 0	„ 3 0	1 6	„ 3 0	1 6	„ 3 0	2 6	—
Marrows, Vegetable, per dozen	0 9	„ 1 6	1 0	„ 1 6	1 0	„ 1 6	0 9	„ 1 0
Marrows, per tally	3 0	„ 4 0	3 0	„ 4 0	3 0	„ 4 0	3 0	„ 4 0
Mint, per dozen bunches	1 6	„ 3 0	4 0	„ 4 6	3 0	„ 6 0	2 0	—
Mushrooms, House, per lb.	0 9	—	0 6	„ 1 0	1 0	—	1 0	„ 1 3
Onions, cwt. bags	3 6	„ 4 0	—	—	4 0	—	4 0	—
Onions, new, bunches	4 0	—	3 0	—	3 0	—	2 0	—
Parsley, new, per doz. bunches	1 6	„ 3 0	4 6	„ 5 0	1 0	„ 1 6	1 0	„ 2 0
Parsley, in sieves	1 0	—	—	—	1 0	—	1 0	—
Peas, blue, per bushel	2 6	„ 6 0	5 6	„ 6 0	—	„ 7 0	5 0	„ 6 0
Peas, blue, per bag	5 0	„ 6 6	7 0	„ 9 0	12 0	„ 14 0	—	—
Potatoes, Hebrons, Snowdrops, etc., per ton	60 0	„ 90 0	70 0	„ 100 0	80 0	„ 100 0	60 0	„ 80 0
Radishes, Round, breakfast, per dozen bunches	1 6	—	1 6	—	1 6	—	1 6	—
Salad, Small, per dozen punnets	1 3	—	1 3	—	1 3	—	1 3	—
Spinach, New Zealand, per pk.	0 9	„ 1 0	0 9	„ 1 0	0 9	—	0 9	—
Spinach, per sieve	1 6	—	1 6	„ 2 0	1 6	—	1 6	—
Tomatoes, New English, per lb.	0 3	„ 0 4	0 3½	„ 0 4	0 3	„ 0 4	0 3	„ 0 3½
Tomatoes, Channel Islands, per lb.	0 2½	„ 0 3	0 2½	„ 0 3	0 2½	„ 0 3½	0 2	„ 0 2½
Turnips, new, per dozen	4 0	„ 5 0	5 0	„ 6 0	5 0	—	5 0	—
Watercress, per dozen bunches	0 6	—	0 4	„ 0 6	0 4	„ 0 6	0 4	„ 0 6
FRUIT—								
Apples, all home grown :—								
„ Eating, per bushel	5 0	—	3 0	„ 5 0	3 0	„ 5 0	—	—
„ Julien, per bushel	4 0	„ 4 6	3 0	„ 4 0	3 0	„ 4 0	3 0	„ 4 0
„ Keswick, per bushel	3 6	„ 4 0	3 0	„ 4 0	2 6	„ 4 0	2 0	„ 3 6
„ Suffield, per bushel	6 0	„ 6 6	5 0	„ 6 0	4 0	„ 5 0	2 0	„ 3 0
Currants, Black, per sieve	5 0	„ 6 0	7 0	„ 8 0	6 0	„ 7 0	—	—
„ Red, per sieve	3 0	„ 5 0	3 0	„ 4 0	3 0	„ 4 0	—	—
„ White, per gallon	2 0	„ 2 6	2 0	„ 2 6	2 0	—	—	—
Grapes, English, Hamburgh, per lb.	1 6	„ 2 0	1 0	„ 1 9	1 0	„ 1 6	1 0	„ 1 6
Grapes, Alicante, per lb.	1 0	„ 1 4	1 0	„ 1 6	1 0	„ 1 6	1 0	„ 1 3
„ Gros Colmar, per lb.	1 6	„ 1 9	1 6	„ 2 0	1 6	„ 2 0	1 6	„ 2 0
„ Gros Muscats per lb.	2 0	„ 2 6	2 0	„ 4 0	2 0	„ 3 6	2 0	„ 2 6
Peaches, A, per dozen	7 0	„ 10 0	6 0	„ 10 0	6 0	„ 9 0	6 0	„ 8 0
„ B, per dozen	2 0	„ 5 0	3 0	„ 5 0	3 0	„ 5 0	2 0	„ 4 0
Plums, Blue, per sieve	5 6	—	6 0	„ 7 0	6 0	„ 7 0	6 0	„ 7 0
„ Orleans, per sieve	5 0	„ 6 6	8 0	—	6 0	„ 8 0	4 0	—
„ Rivers (English), per sieve	5 0	„ 6 0	6 0	„ 7 0	5 0	„ 6 0	—	—
Plums, Gages, per sieve	8 0	„ 11 0	10 0	—	8 0	—	7 0	„ 9 0
„ Gages, per peck	5 6	—	5 6	—	4 0	—	4 0	—
Raspberries, per cwt.	30 0	„ 32 0	30 0	—	28 0	„ 30 0	—	—
„ per punnet	5 0	„ 9 0	5 0	„ 5 0	10 0	—	—	—

DISEASES OF ANIMALS IN GREAT BRITAIN.
 NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Board of Agriculture, in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Pleuro-Pneumonia.			Swine-Fever.	
	OUTBREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUTBREAKS Confirmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	No.	No.	No.	No.
March, 1898 -	1	1	220	578	11,466
June, 1898 -	—	—	—	879	15,352
September, 1898 -	—	—	—	550	8,017
December, 1898 -	—	—	—	507	8,921
March, 1899 -	—	—	—	594	8,077
June, 1899 -	—	—	—	917	10,799

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax** and **Glanders** in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).	
	OUTBREAKS Reported.	ANIMALS Attacked.	OUTBREAKS Reported.	ANIMALS Attacked.
	No.	No.	No.	No.
March, 1898 -	156	245	197	381
June, 1898 -	169	254	195	337
September, 1898 -	92	134	188	361
December, 1898 -	139	223	168	306
March, 1899 -	135	247	176	328
June, 1899 -	153	315	177	266

NUMBER OF CASES of **Rabies** in DOGS in GREAT BRITAIN during each of the under-mentioned periods.

THREE MONTHS ENDED	Number of Cases.
31st March, 1898 -	8
30th June, 1898 -	6
30th September, 1898 -	1
31st December, 1898 -	2
31st March, 1899 -	1
30th June, 1899 -	—

DISEASES OF ANIMALS IN IRELAND.

NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Lord Lieutenant and Privy Council in IRELAND, in each of the under-mentioned periods.

QUARTER ENDED	Pleuro-Pneumonia.			Swine-Fever.	
	OUT- BREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUT- BREAKS Con- firmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	No.	No.	No.	No.
March, 1898 -	—	—	—	81	1,039
June, 1898 -	—	—	—	97	1,225
September, 1898 -	—	—	—	105	1,269
December, 1898 -	—	—	—	42	496
March, 1899 -	—	—	—	80	1,356
June, 1899 -	—	—	—	95	1,541

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax**, **Glanders**, and **Rabies** in Ireland in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).		Rabies.	
	OUT- BREAKS REPORTED.	ANIMALS ATTACKED.	OUT- BREAKS REPORTED.	ANIMALS ATTACKED.	CASES REPORTED.	
					DOGS.	OTHER ANIMALS.
	No.	No.	No.	No.	No.	No.
March, 1898 -	1	8	—	—	13	2
June, 1898 -	—	—	1	1	28	11
Sept., 1898 -	1	3	2	4	31	12
Dec., 1898 -	—	—	3	3	30	5
March, 1899 -	1	1	—	—	20	5
June, 1899 -	—	—	4	6	22	3

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money in a Post Office Savings Bank, he should apply to the Trustees of the Savings Bank for a Certificate of Transfer (in the form prescribed by the 10th section of the Act 24 Vict., c. 14), and should pay the certificate into any Post Office Bank as if it were a cheque. By adopting this course, the depositor will avoid trouble and the risk of carrying cash from one bank to the other.

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LIST OF LEAFLETS ISSUED BY THE BOARD OF AGRICULTURE.

Number.	Title.
Leaflet No. 1	Mites on Currant and Nut Trees.
" " 2	Vine and Raspberry Weevils.
" " 3	The Turnip Fly or Flea.
" " 4	Caterpillars on Fruit Trees.
" " 5	The Mangel Wurzel Fly.
" " 6	The Field Vole.
" " 8	Farmers and Assessments to Local Rates.
" " 9	Ensilage.
" " 10	Wireworms.
" " 11	The Daddy Longlegs.
" " 12	The Gooseberry Saw-Fly.
" " 13	Acorn Poisoning.
" " 14	The Raspberry Moth.
" " 15	The Apple Blossom Weevil.
" " 16	The Apple Sucker.
" " 18	Fertilisers and Feeding Stuffs Act.
" " 19	Pea and Bean Weevil.
" " 20	The Magpie Moth.
" " 21	The Warble Fly.
" " 22	The Diamond Back Moth.
" " 23	Potato Disease.
" " 24	The Ribbon Footed Corn-Fly.
" " 25	The Cockchafer.
" " 26	Farmers and the Income Tax.
" " 27	Remission of Tithe Rentcharge.
" " 28	Anthrax.
" " 29	Swine Fever.
" " 30	The Codlin Moth.
" " 31	The Onion Fly.
" " 32	Foul Brood or Bee Pest.
" " 33	Surface Caterpillars.
" " 34	The Woolly Aphis or American Blight.
" " 35	The Celery Fly.
" " 36	Cultivation of Osiers.
" " 37	Rabies.
" " 38	The Carrot Fly.
" " 39	Assessments to Land Tax.
" " 40	The Kestrel or Windhover.
" " 41	The Red Spider or Spinning Mite.
" " 42	The Short-eared Owl.
" " 43	Titmice.
" " 44	The Common Lapwing or Plover.
" " 45	The Starling.
" " 46	The Stem Eelworm.
" " 47	The Asparagus Beetle.
" " 48	The Pea Thrips.
" " 49	The Fruit Tree Beetle.
" " 50	Water Wagtails or " Dishwashers. "
" " 51	The White or Barn Owl.
" " 52	Gooseberry Blight.
" " 53	The Pear Midge.
" " 54	The Spotted Flycatcher.
" " 55	The Swallow.
" " 56	The Canker Fungus.
" " 57	External Parasites of Poultry.

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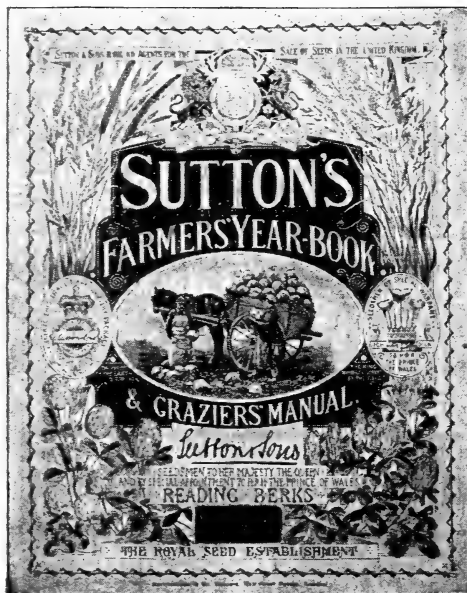
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The Journal

OF THE

BOARD OF AGRICULTURE

DECEMBER, 1899.

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THE JOURNAL

OF THE

BOARD OF AGRICULTURE.

Vol. VI. No. 3. DECEMBER, 1899.

THE GRAIN HARVEST OF 1899.

The preliminary statement showing the estimated produce of the three chief cereal crops in Great Britain was issued by the Board of Agriculture on the 5th inst. The estimated yield of wheat per acre is returned as $32\frac{3}{4}$ bushels, and this, although two bushels below the very exceptional record of 1898, is still nearly three bushels above the decennial average yield of Great Britain. Only twice, viz., in 1896 and 1898, during the fifteen years in which produce estimates have been officially collected, has the yield stood at so high a figure. The reduction by 101,225 acres of the area under wheat in the past season as compared with 1898, disclosed in the returns published in August last, together with the lowered yield per acre, makes the aggregate production of wheat nearly a million quarters smaller than in 1898. The figures for 1899, as compared with 1898, and with the ten years' average, are as follows :—

WHEAT.	Estimated Total Produce.		Estimated Yield per Acre.		Average of the Ten Years 1889-98.
	1899.	1898.	1899.	1898.	
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
England - - -	62,380,067	69,074,387	32'83	34'76	29'85
Wales - - -	1,380,938	1,582,086	25'62	26'83	24'03
Scotland - - -	1,768,320	2,372,383	37'42	42'47	36'94
Great Britain -	65,529,325	73,028,856	32'75	34'74	29'86

ESTIMATE OF TOTAL PRODUCE, ACREAGE, AND ESTIMATED YIELD PER ACRE OF WHEAT, BARLEY, AND OATS.

AGRICULTURAL DIVISIONS.	WHEAT.			BARLEY.			OATS.		
	Estimated Total Produce.	Acres.	Estimated Yield per acre.	Estimated Total Produce.	Acres.	Estimated Yield per acre.	Estimated Total Produce.	Acres.	Estimated Yield per acre.
ENGLAND.—									
Division I.—									
(a.) Bedford, Hunts, Cambs., Suffolk, Essex, Herts, Middlesex, London	16,337,665	476,284	34'30	12,202,222	349,807	34'88	9,235,055	200,321	46'10
(b.) Norfolk, Lincoln, York (East Riding)	13,595,801	399,739	33'94	16,625,384	479,446	34'68	12,736,641	269,036	47'34
Total	29,933,556	876,023	34'14	28,827,606	829,253	34'76	21,971,696	469,357	46'81
Division II.—									
(a.) Kent, Surrey, Sussex, Berks, Hants	7,816,199	234,067	33'39	4,216,879	121,378	34'74	10,395,354	233,800	44'08
(b.) Notts, Leicester, Rutland, Northants, Bucks, Oxford, Warwick	7,514,250	234,635	32'03	5,849,106	180,183	32'46	6,375,792	171,988	37'07
Total	15,330,449	468,702	32'71	10,065,985	301,561	33'38	16,680,646	405,788	41'11
Division III.—									
(a.) Salop, Worcester, Gloucester, Wilts, Monmouth, Hereford	6,825,201	216,873	31'47	5,136,052	157,375	32'64	6,259,633	162,575	38'50
(b.) Somerset, Dorset, Devon, Cornwall	4,700,857	158,926	29'58	4,298,268	127,682	33'66	8,387,528	231,954	36'32
Total	11,526,058	375,799	30'67	9,434,320	285,057	33'10	15,147,161	394,529	38'39
Division IV.—									
(a.) Northumberland, Durham, York (North Riding), York (West Riding)	3,038,071	98,875	30'73	6,645,660	184,547	36'01	9,143,423	226,713	40'33
(b.) Cumberland, Westmorland, Lancashire, Stafford, Cheshire, Derby	2,581,933	80,428	32'10	1,190,742	35,216	33'81	10,962,362	285,262	38'43
Total	5,620,004	179,303	31'34	7,836,402	219,763	35'66	20,105,785	511,975	39'27
Total for England	62,380,067	1,899,827	32'83	56,164,313	1,635,634	34'34	73,905,288	1,781,649	41'18
Wales	1,380,938	43,868	25'62	3,358,494	105,978	31'41	7,577,952	220,233	34'8
Scotland	1,768,320	47,256	37'42	8,222,891	240,496	34'19	33,313,304	957,873	34'78
Great Britain	65,529,325	2,000,981	32'75	67,715,698	1,982,108	34'16	114,746,544	2,959,755	38'77

The extent of land under wheat in Scotland and Wales is comparatively insignificant, and consequently the results realised in those parts of the kingdom do not greatly affect the total, but it may be noted that in Wales the yield was returned as only $1\frac{1}{2}$ bushels, and in Scotland only half a bushel above the ten years' average, so that in 1899, England, with an excess of three bushels, was much the most favoured.

Looking still more closely into the variations of the local estimates so far as at present available, and pending the completion of the necessary calculations for each county, the table given on p. 290 shows that the district returning the highest average yield of wheat was that which embraces Bedford, Hunts, Cambridge, Suffolk, Essex, Herts, and Middlesex; while the sub-division comprising Norfolk, Lincoln, and the East Riding of Yorkshire stands second instead of first, as in the two years immediately preceding. For the whole of the distinctively corn-growing division of England, consisting of the counties above-named and comprising two-fifths of the whole of the land under wheat in Great Britain, the average yield per acre was 34·14 bushels, or nearly $1\frac{1}{2}$ bushels in excess of the yield returned for the country as a whole.

The estimated total yield of barley closely approached the figure returned for 1898, a diminished product per acre being to some extent counterbalanced by an extended area. The

BARLEY.	Estimated Total Produce.		Estimated Yield per Acre.		Average of the Ten Years 1889-98.
	1899.	1898.	1899.	1898.	
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
England - - -	56,164,313	55,377,522	34·34	35·44	33·16
Wales - - -	3,328,494	3,377,413	31·41	32·82	29·87
Scotland - - -	8,222,891	9,296,983	34·19	39·07	36·29
Great Britain -	67,715,698	68,051,918	34·16	35·75	33·26

average yield of 34·16 bushels is $1\frac{1}{2}$ bushels below that of the previous year, but is still nearly a bushel above the decennial average, although it has been five times exceeded during the

past fifteen years. Scotland, in the case of barley, returns a yield per acre which is more than two bushels below the average, and nearly five bushels less than in 1898.

The sub-division showing the highest yield of barley was, as in 1898, that consisting of Northumberland, Durham, and the North and West Ridings of Yorkshire, the average being estimated at 36 bushels per acre. The group of eastern and home counties, which has already been mentioned as returning the heaviest crop of wheat, came second in the list as regards barley with an average crop of 34·88 bushels per acre.

The year's crop of oats in Great Britain gives an average yield per acre very closely approximating to the ten years' standard; but in the case of this crop the position of Scotland is very considerably less satisfactory than that of the rest of Great Britain. South of the Tweed the yield of oats was on the whole slightly over average, whereas the Scottish crop, covering about one-third of the area devoted to oats in Great Britain, was two bushels less than an average.

OATS.	Estimated Total Produce.		Estimated Yield per Acre.		Average of the Ten Years 1889-98.
	1899.	1898.	1899.	1898.	
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>per Acre.</i>
England - - -	73,905,288	75,282,761	41·48	43·49	40·84
Wales - - -	7,527,952	8,389,938	34·18	36·37	33·06
Scotland - - -	33,313,304	35,248,218	34·78	36·87	36·74
Great Britain -	114,746,544	118,920,917	38·77	40·76	38·86

The table on p. 290 gives the estimated total produce, the acreage, and the estimated yield per acre of wheat, barley, and oats in the year 1899, in each division or group of contiguous counties into which the country has been divided for the purposes of the Produce Returns.

THE INFLUENCE OF MANURES ON THE PRODUCTION OF MUTTON.

In the *Journal of the Board of Agriculture*, Vol. V., p. 300 (December 1898) an account was given of the results, up to the end of the second year, of experiments on this subject that were started in the spring of 1897 at the Northumberland County Demonstration Farm of Cockle Park. The grazing of 1899 constituted the third year of these experiments, and it is now proposed, as shortly as may be, to bring the results up to date.

Those who have followed the experiments are aware that they deal with an area of poor pasture, which, in its natural state, is valued at 5s. per acre per annum. Incidentally, it may be remarked that such land in its unimproved condition is worth even this small rent only for a very limited number of purposes, of which, if we may accept our valuer's figures, the grazing of shearling wethers is not one. This conclusion is unavoidable when it is noted that in two years out of the three, the sheep on the untreated ground were valued at considerably less per head at the end of the grazing season than they had cost at the beginning. How much of this reduction in value may be actual and intrinsic, and how much may be due to the relatively higher price of store sheep in spring than in autumn, it is impossible to say. It may, however, be remarked that this reduction in value is not justified by the weights, for even in the two years referred to the average gain per head for the season's grazing was 14 lbs. and 24 lbs. respectively.

The field selected for experiment was subdivided into ten plots of three acres each, which were surrounded by substantial fences. Each of these main plots included a sub-plot of 1-20th acre, the object being to test the effect of manurial substances on sheep grazing the pasture of the main plots, and

also their effect on the herbage of the sub-plots, whose produce was mown and calculated as hay. The sub-plots also offered the opportunity of separating the herbage into its botanical constituents, as has been done each year, and of making a chemical analysis of the herbage for the crop of 1899.

As the value of a botanical analysis depends entirely on the accuracy of the methods of sampling and separation, it may be mentioned that the sampling has each year been done upon a system which was selected after very careful consideration. This work, as well as the separations, were in 1899 undertaken under the personal supervision of Professor Potter and Mr. F. O. Solomon, most of the actual work of separating being done by two advanced students—Mr. Hacking, Gold Medallist of the R.A.S.E. in 1898, and Mr. Abram, Silver Medallist in 1899. The chemical analyses of the soil and hay were made by Mr. S. Hoare Collins, the Agricultural Chemist of the College.

Each main plot is supplied with water for the use of the stock, and in other respects all are much alike.

A full statement of the manurial treatment is given in Tables I. and II, from which it will be seen that Plots 2, 3, 4, 5, and 10 have received nothing since the spring of 1897, and that Plots 7, 8, and 9 received supplementary dressings of potash, lime, and sulphate of ammonia respectively for the season of 1899.

The sheep used in 1899 (wedders by a Border Leicester ram out of a Cheviot ewe) were specially bought for the experiment in the beginning of May. From the 120 that were purchased 80 of the most suitable were selected and placed on the plots on May 4th. The method of selection adopted was to tattoo a permanent number in one of the ears of each sheep and record its weight. All the weights were then systematically examined, and a selection made of the requisite number of sheep that deviated the least from the average weight. By careful adjustment it was possible to arrange the animals of each lot so that the average weight was practically alike. Of the rest, six were used for stocking an extra unmanured plot that has been in existence for the past two seasons, a few were resold, and the rest were kept

TABLE I.

INFLUENCE OF MANURES ON THE PRODUCTION OF MUTTON IN THE TREE FIELD AT COCKLE PARK.
RESULTS PER ACRE FOR THE GRAZING SEASONS OF 1897, 1898, 1899.

In 1897 each plot was grazed by eight Sheep for 16 weeks (June 21st to Oct. 11th). In 1898 eight Sheep were, on May 16th, placed on Plots 2, 4, 5, 7, 8, 9, 10; six on Plot 6; and ten on Plots 1 and 3. On June 27th another Sheep was added to those on Plots 1 and 7, while two were added to those on Plots 3, 9, 10. The Grazing Season of 1898 extended to 20 weeks (May 16th to Oct. 3rd). On May 4th, 1899, six Sheep were placed on Plots 2 and 6, eight Sheep on Plots 1, 4, 5, 7, 8, 9, 10; and 12 Sheep on Plot 3. No alterations were made during the Season, which extended to 20 weeks (May 4th to Sept. 21st). Deducting wool the Sheep cost per head 29/- in 1897, 25/- in 1898, and 32/6 in 1899.

Plots.	Treatment per Acre in 3 years.	Live weight increases in : Cost of Treatment in 3 years.				Live Weight increase in excess of Plot 6.		Butcher's valuation per Sheep at the end of each Season.		Net Gain (+) or Loss (-) per Acre in 3 years as determined by :		Live Weight gain per Sheep per week during the Season.			Plots.
		Live weight increases in :				Live Weight increase in excess of Plot 6.		Butcher's valuation per Sheep at the end of each Season.		Net Gain (+) or Loss (-) per Acre in 3 years as determined by :		Live Weight gain per Sheep per week during the Season.			
		1897	1898	1899	Total	Wgt. in lbs.	Value at 3d. per lb.	1897	1898	1899	(a) Weight.	(b) Butcher.	1897	1898		1899
		lbs.	lbs.	lbs.	lbs.	lbs.	£ s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1	Total of 5½ cwt. Dec. Cot. Cake eaten by Sheep in 1897 and 1898 (= 42 lbs. N-trogen), nothing in 1899	80	144	106	330	192	3 0 0	36 0	31 0	30 0	+27 6	+28 1	1 9	2 0	2 0
2	4 Tons Common Lime for 1897, nothing since	32	64	47	143	5	0 1 7	32 0	24 0	31 0	-50 5	-38 8	0 7	1 2	1 1
3	½ Ton Basic Slag (200 lbs. Ph. Ac.) for 1897, nothing since	22	77	211	459	321	5 0 4	33 0	34 0	38 0	+78 4	+56 10	1 8	2 2	2 6
4	½ Ton Basic Slag (100 lbs. Ph. Ac.) for 1897, nothing since	11	44	113	270	132	2 1 3	30 0	33 0	35 0	+30 3	+30 8	1 0	2 1	2 1
5	7 cwt. Super (100 lbs. Ph. Ac.) for 1897, nothing since	18	56	104	263	125	1 19 1	32 0	30 6	33 0	+20 11	+16 10	1 3	1 9	1 9
6	Untreated throughout	—	37	53	48	—	—	26 0	28 0	28 0	—	—	0 9	1 3	1 2
7	7 Cwt. Super and ½ Cwt. Sulp. Potash (= 50 lbs. Potash) for 1897, Potash repeated for 1899	33	6	121	107	162	2 10 7	32 0	33 0	35 0	+17 1	+15 9	1 7	2 1	2 0
8	7 Cwt. Super and ½ Ton Ground Lime for 1897, Lime repeated for 1899	38	2	69	119	164	2 11 3	33 0	32 0	38 0	+13 1	+16 10	1 6	2 2	2 1
9	7 Cwt. Super and 97 lbs. Sulp. Ammonia (= 20 lbs. N) for 1897, 70 lbs. Sulp. Ammonia (= 14 lbs. N) for 1899	33	3	79	109	144	2 5 0	33 0	30 0	34 0	+11 9	+8 3	1 8	1 5	2 0
10	6 Cwt. Dis. Bones (= 100 lbs. Ph. Ac.) and 17 lbs. N for 1897, nothing since	30	7	59	117	144	2 5 0	34 0	32 0	33 0	+14 5	+16 3	1 4	1 9	2 0

in reserve, to be used as substitutes for unsuitable animals.

As in the two former seasons, so in 1899, nothing serious occurred to disturb the experiment. A sheep on Plot 5 died on August 30th, one on Plot 6 became unhealthy and was removed on September 7th, and one on Plot 9 and another on Plot 10 were removed on account of minor ailments on August 5th. In every case sheep of the same weight on the date of the immediately preceding weighing were at once substituted.

The sheep were all weighed, after fasting twelve hours, at the commencement of the season's grazing, while they were also weighed in a similar fasted condition at the end of the 2nd, 3rd, 4th, and 5th months. At the end of the first month they were not fasted before weighing. If we assume a loss of weight of 5 per cent. after fasting twelve hours, we may substitute a "fasted weight" for that actually got at the end of the first month, when we have the following figures representing the average weekly gain or loss per head for the whole of the animals :—

Period	Average weekly gain in 1897.	Average weekly gain in 1898.	Average weekly gain in 1899.
	lbs.	lbs.	lbs.
During the 1st month -	2.26	3.43	2.90
" " 2nd month -	2.01	3.41	2.32
" " 3rd month -	1.10	1.77	1.62
" " 4th month -	0.32	1.25	1.77
" " 5th month -	—	0.24*	1.35

* Loss.

Each year, as will be seen, the general tendency is towards a markedly smaller weekly gain as the season advances, and as the animals get fatter. Growth was better maintained in 1899 than in any of the preceding years—in fact it actually rose a little in the 4th month—a result doubtless due to the flush of grass induced by the showers of August last.

In each of the years of the experiment every sheep was weighed separately, and the various individual records of the animals of any particular plot agree with satisfactory consistency. These records, amounting, as they do, to nearly 2,000, are, however, much too extensive to be reproduced here, though reference may occasionally be made to them.

In 1899, as in preceding years, a Newcastle butcher-salesman inspected and valued the various lots on the last day of the experiment, and selected representative sheep for slaughter. While in 1898 two sheep were taken from each plot for slaughter, this was not done in 1899 in the case of Plots 2 and 6, these plots failing to furnish any animals in "killing" condition. Although the butcher's valuations are a useful supplement to the computations based on the weights—with which they are, in almost every case, in close agreement—it seems reasonable to conclude that, on the whole, the valuations deduced from the weights are the more reliable. The weighings give the accurate gain per sheep and per lot during each season, whereas the butcher's figures deal only with the size and condition of the animals at the end of the season. The final weight, to a certain extent, depends on the size of the animals to start with, which, of course, has nothing to do with the season's grazing; and although the average initial weight of each lot before clipping showed less than 1 lb. of deviation, there was necessarily a greater variation than this amongst individuals.

The return per acre per annum, as deduced from the butcher's valuation, has been computed from the initial cost of the sheep, and not simply from a comparison of the final valuations of the different lots. The two methods, however, give results that in no case differ, on the average of the three years, by so much as 1s. per acre.

The sheep were washed on the day before, and shorn ten days after, the experiment started, the weight of the fleece being deducted from the initial weight of each animal.

In 1899 a new departure was taken, in having a wool expert present on the last day of the experiment, and his notes are added to those of the butcher. Any differences in the estimated amount of wool have not, however, been taken account of in the Tables.

Plot 1.—The effects of Cake.—The sheep of this plot received $\frac{3}{4}$ lb. per head per day of decorticated cotton cake in 1897 and 1898, while in 1899 they got nothing but grass, the idea being to see what improvement the cake residues of the first two years had produced on the pasture of the third.

Reference to Table I. will show that the manurial residue of $5\frac{1}{3}$ cwt. of cake consumed in 1897 (2 cwt.) and 1898 ($3\frac{1}{3}$ cwt.) had practically the same effect on the herbage—as tested by the sheep—as the residues, two years after application, of the slag of Plot 4, the super of Plot 5, and the dissolved bones on Plot 10. The cake-residues have, in fact, increased the live-weight per acre in 1899 from 48lbs. (Plot 6) to 106lbs., and if this gain of 58lb. be valued at $3\frac{3}{4}$ d. per lb. it amounts to 18s. 2d., or £3 8s. 2d. per ton, a figure which is practically double that brought out by Lawes and Gilbert's revised Tables.

As the result of giving sheep cake for two years, and pasturing them for a third year on the herbage grown by the manurial residues, we have the very substantial net gain of 27s. 6d. per acre, as determined by our weights, or of 28s. 1d. as determined by the butcher; and these figures, divided by three, show an average profit of between 9s. and 10s. per acre per annum. Comparison with the other plots will show that in point of profit Plot 1 comes out third in the series. Of the eight sheep on this plot in 1899, three were prime fat at the end of the season.

As the sub-plot of No. 1 received at the rate of 6 cwt. per acre of crushed cake in 1897, nothing in 1898, and was on an area in 1899 that had been pastured by sheep getting cake in the two previous years, it is impossible to say precisely what the outlay for manure for the aggregate hay-crop of the three years has been, so that no conclusions as regards profit and loss can be drawn. It may, however, be pointed out that the yield of the hay crop on this plot was fairly satisfactory in 1899, while the herbage was chiefly characterised by the abundance of Yorkshire fog, and the almost complete absence of clover.

The joint report of the butcher and wool-expert is as follows :—

“Sheep in healthy growing condition. Wool averaging 3lbs. per fleece, longer and stronger in staple than in the case of the sheep of Plots 2 and 6.”

Plots 2 and 8.—The effects of Lime.—Where ordinary lime, at the rate of four tons per acre, was applied (Plot 2) the

effects have been practically unobservable. In each of the three years the average gain per head per week has actually been rather less on Plot 2 than on the unmanured plot (No. 6). The small total live-weight gain on this plot, above the yield of No. 6, is entirely due to the fact that in 1898 it was grazed by eight sheep, as compared with six on Plot 6. When the number of sheep was the same on these two plots the results are rather against the lime, and this apart altogether from the question of outlay. Not a single sheep on Plot 2 was ready for the butcher at the end of 1899.

The lime has, however, somewhat increased the yield of hay, but this is of very poor quality, containing as it does more *Agrostis* than any of the treated plots, and practically no clover. This result has come to many as a great surprise, and it is worth noting that even at the end of the third year—with only negative results to refer to—some farmers still cling to the idea that lime will yet assert itself.

Although common lime, when used alone, has so far done nothing to improve the pasture, a very different result has been got on Plot 8, which in 1897 and again in 1899 received half a ton per acre of pulverised lime as an addition to superphosphate. This plot, in fact, has been treated exactly like No. 5, so far as the super is concerned, but whereas No. 5 received no lime, No. 8 was dressed with lime as indicated. Comparison of these two plots (Table I.) will show that the lime has each year added to the aggregate production of mutton, the gross gain on the three years being 39 lbs. per acre. But this result does not indicate the whole benefit, for whereas, in 1899, Plot 5 furnished only two fat sheep, Plot 8 furnished five. When the two lots were placed in adjacent pens for inspection by the butcher, he expressed the opinion that the difference was so marked that had he not known the animals to be originally of the same lot he could not have believed they were the same "class" of sheep. Reference to Table I. will show that he valued those on Plot 8 at the same rate per head as the highest of the series.

Judged by the weight of the sheep, and disregarding residual value, the addition of the lime to the super has not

left a profit ; but it has paid its way from the butcher's point of view. Possibly the free lime in the basic slag may be the cause of that manure proving slightly superior to super., as shown below.

The effect of the lime of Plot 8 on the weight of hay was practically immaterial, but it was very manifest on its botanical composition. The plot was in marked contrast to No. 5 in regard to the richness of its herbage, and this superiority could be seen from a long distance. The botanical analysis of 1899 shows that *Agrostis* has been reduced from 45 per cent. (Plot 5) to 33 per cent., cocksfoot has been raised from 5 per cent. to 7 per cent., fescues and Yorkshire fog from 5 per cent. to 8 per cent. each, and white clover from 2 per cent. to 6 per cent.

The joint report of the butcher and wool-expert is as follows :—

"Plot 2, sheep in rather better condition than those on No. 6, wool $2\frac{1}{2}$ lbs. Plot 8, sheep better quality than those of No. 3, though not so heavy. Quality and lustre of the wool as good as in the case of No. 3, but $\frac{1}{4}$ lb. less of it, *i.e.*, $3\frac{1}{4}$ lbs. As compared with Plot 5, the sheep of No. 8 are very superior, and carry $\frac{1}{4}$ lb. more wool."

Plots 4 and 5.—5 cwt per acre of basic slag compared with an equivalent amount of super.—In comparing basic slag with superphosphate the basis may be :

(a) Equality of weight—5 cwt., let us say, of slag being tested against 5 cwt. of super. Such a basis, however, would have nothing to recommend it, for equal quantities of these materials would represent neither equal cost, nor an equal amount of plant food.

(b) Equality of cost—a system of comparison that is unsatisfactory on account of the fluctuations of the market.

(c) Equality of amount of plant food—which is the most strictly accurate basis of comparison, and the one here adopted. Plots 4 and 5 each received 100 lbs. of phosphoric acid in the spring of 1897 in the form of 5 cwt. of basic slag and 7 cwt. of superphosphate respectively, nothing having since been applied. In the first year the super.—as was to be expected—produced more effect than the slag, but in the

second and third seasons their positions have been reversed. On the total results of the three years the slag has given 132lbs. per acre of live-weight increase, as against 125lbs for the super. The butcher's valuations are also strictly in agreement with the weights, and if the 7 cwt. of super could have been bought for the same money as the 5 cwt. of slag, the financial results would have been approximately the same. On account, however, of the much higher price of super. per ton and per unit, it has given considerably less net profit than the slag on the three years working, though both paid satisfactorily.

The results on the hay are similar to those obtained with the sheep; in the first year the super did better than the slag, but in the succeeding years the order was reversed. The main features of the botanical analysis of the herbage of 1899 are that super has done less than slag to suppress the undesirable grass *Agrostis*, while slag has had more influence in stimulating good plants such as cocksfoot, fescues, and white clover.

The joint report of the butcher and wool expert is as follows:—"Sheep on Plot 5 appear to have been stationary for some time; those on Plot 4 have done better. Wool on No. 5 not so well grown as that of No. 4, and about $\frac{1}{4}$ lb. less of it. Two sheep prime fat on each plot."

Plots 3 and 4.—*The comparative effects of 10 cwt. (Plot 3) and 5 cwt. (Plot 4) per acre of basic slag applied for the season of 1897, nothing since.* In 1897 the same number of sheep (8 grazed these two plots, with the result that the larger dressing of basic slag gave 40lbs. per acre of live-weight increase in excess of the unmanured plot, whereas the smaller dressing gave only 7 lbs. In 1898 eight sheep grazed Plot 4, as compared with 10—increased at the end of the sixth week to 11—sheep on Plot 3. The live weight increase attributable to the smaller dressing of slag was, at the end of that season, 60 lbs. per acre, which contrasts with 118 lbs. to the credit of the heavier dressing. In 1899 twelve sheep grazed Plot 3 for the whole season, whereas Plot 4 could provide food for eight only. The results in this—the third season—were the most striking of all, the live weight increase produced by the

larger dose of slag—as compared with the unmanured plot—being 163 lbs. per acre, as against 65 lb. where half the quantity of slag was used. Each year the larger dressing of slag has produced practically at least double the amount of mutton, the aggregate increase above the unmanured plot being 132 lbs. for the smaller and 321 lbs. for the larger dressing. Deducing the financial results from the weights, we have a clear profit in the three years of 30s. 3d. per acre from Plot 4 and 78s. 4d. from Plot 3, the butcher's figures being 30s. 8d. and 56s. 10d. respectively. It is worth noting that the only two cases where the valuer's figures differ seriously from ours are those where profits are at their minimum (Plot 2) and maximum (Plot 3). In these extreme cases the valuer evidently could not bring himself to go quite so far as the actual condition of the sheep warranted.

The heavier stocking of Plot 3 would, one would think, have interfered somewhat with the thriving of the animals, but this is not indicated by the figures in Table I, which show that each year the average weekly gain per head has been greater on Plot 3 than on Plot 4. In 1899 we had an exceptionally favourable opportunity of comparing the progress of twelve sheep confined uninterruptedly for five months on three acres, with the progress of the same class of sheep grazing adjoining fields along with cattle. In the latter case the animals (13 "reserves" of the experimental sheep) had practically unlimited scope, with occasional changes from field to field; and although none of their pasture had received as much as 10 cwt. per acre of slag, much of it had been treated with this substance, and food was present in great abundance. The average weekly gain in their case was 25 lbs., which is just under the average weekly gain of the twelve sheep on Plot 3. Although this result does not prove that the confinement has not somewhat interfered with the rate of growth of the experimental animals, it shows that such interference, if any, has been slight. It is, however, to be noted that the sheep selected for slaughter from the reserves showed a much higher percentage of carcase than those from Plot 3.

The superior progress of the sheep on Plot 3 is perhaps most clearly shown by a study of the monthly weights of the

TABLE III.
INDIVIDUAL MONTHLY WEIGHTS IN 1899 OF SHEEP ON PLOTS
3 AND 4.

PLOT 3.							
Sheep No.	Weight in lbs. on the dates :—						Gain per Sheep. lbs.
	May 4.	June 1*.	June 29.	July 27.	Aug. 24.	Sept. 21.	
67	67	80	88	95	108	115	48
84	70	87	98	107	112	123	53
91	70	89	98	111	119	127	57
90	71	91	95	107	116	126	55
73	72	89	96	101	111	119	47
34	72	92	99	110	119	125	53
15	71	91	97	104	113	120	49
19	76	102	106	118	129	138	62
61	76	96	103	113	124	127	51
48	76	96	99	110	122	130	54
107	81	99	108	117	126	132	51
104	79	94	98	108	123	131	52
Average.	73.4	92.2	98.8	108.4	118.5	126.1	52.7

PLOT 4.							
17	84	93	107	110	117	122	38
58	80	92	96	102	108	112	32
64	75	89	93	101	109	117	42
74	71	86	98	103	108	118	47
55	69	96	91	98	111	116	47
53	70	85	92	99	108	113	43
46	71	80	86	96	105	115	44
43	73	84	96	100	112	118	45
Average.	74.1	88.1	94.9	101.2	109.7	116.4	42.3

* Unfasted.

individual animals (Table III.) From these figures it will be seen that the lowest gain recorded for any sheep on Plot 3 is 47lbs., whereas the highest individual gain on Plot 4 is also 47lbs., in other words the best individual return from Plot 4 is the same as the worst individual return from Plot 3.

It is also worthy of note that although Plot 3 carried twice as many sheep as the untreated ground (Plot 6), these sheep made more than double the weekly gain per head.

The weight of herbage obtained from the sub-plot getting

the larger dressing of slag (No. 3) has always been in excess of the yield of Plot 4, though in 1898 the difference was hardly appreciable. On the three years the total increase of hay has been 42 cwt. on Plot 3, and 29 $\frac{1}{4}$ cwt. on Plot 4. The double dose of slag has thus failed to produce a double increase of hay, whereas it produced much more than a double increase of mutton, showing that the larger dressing of slag has had much more effect on the quality than on the quantity of the herbage.

The difference in the botanical composition of the herbage in 1899 was very marked, and is best summarised thus :—

Percentage abundance of certain plants in 1899.							
		Agrostis.	Dogstail.	Cocks-foot.	York-shire Fog.	Fescues.	White Clover.
Plot 3	$\frac{1}{2}$ Ton Slag	22	17	9	14	12	3
„ 4	$\frac{1}{4}$ Ton Slag	37	10	8	10	7	7

As compared with former years, it was evident that white clover was getting scarcer, and, rather unexpectedly, more was found on Plot 4 than on Plot 3. The main features of Plot 3, as compared with Plot 6, were the greatly reduced yield of Agrostis, and the marked increase of dogstail, Yorkshire fog, and the fescues.

The joint report of the butcher and wool expert is as follows :—“ Sheep on Plot 3 have evidently thriven and done well. Wool same quality as that of No. 1, but half a pound more of it, namely 3 $\frac{1}{2}$ lbs. per sheep. Sheep of Plot 4 have not thriven so well as last, and $\frac{1}{2}$ lb. less wool. On Plot 3, seven of the twelve sheep are prime fat, as against two of the eight on Plot 4.”

The next important matter to be dealt with relates to the question whether the addition of potash and nitrogen to superphosphate has improved the sheep, the wool, or the hay. The effects of the addition of lime to super have already been noted.

Plot 7.—The Effects of adding Potash to Super.—This plot compares with No. 5, which received super but no potash.

On the average of the three years the hay crop has been reduced in weight by the addition of the potash, a result which has frequently been observed on strong land, not only at Cockle Park, but elsewhere. The effects of the potash on the botanical composition of the herbage have been chiefly observable in the increase of cocksfoot, fescues, Yorkshire fog, and white clover, and the reduction of *Agrostis* and crested dogtail. On the whole, one would say that the change in this respect has been in the direction of improvement, and this conclusion is borne out by the growth of the sheep, which have each year given slightly more increase on Plot 7 than on Plot 5, the aggregate difference being 37 lbs. per acre. As the potash cost 15s. 4d. per acre, it is evident that, judged by the weight of the sheep, its use has not been profitable. From the butcher's point of view the case for potash appears decidedly more favourable. In the three years the butcher's valuation is 14s. 3d. per acre in favour of potash; and if this be deducted from the cost of the material, the net debit balance against the potash is only 1s. 1d. per acre, which is probably much more than covered by the residues.

The butcher found four of the sheep on the potash plot to be prime fat (as against two where the super was unsupported by potash), and reported "sheep of Plot 7 of better quality and thriving better than those on No. 5."

As potash is generally regarded as an important substance in the production of wool, the expert was asked to make a very careful inspection of the fleeces of the sheep of Plots 5 and 7. His verdict was, "Quality of No. 7 fine, but lustre deficient, not so deep and well grown as No. 5." Apparently, therefore, the 4½ months' growth of wool has not been improved by the artificial supply of potash to the pasture; in fact, the tendency, if anything, points in the opposite direction.

Plot 9.—Effects of adding Nitrogen to Super.—In the three years a total of 167lbs. of sulphate of ammonia per acre has been used as an addition to the super. of this plot. In the two years of application (1897 and 1899) it has slightly increased the produce of mutton, but neither from the point

of view of weight nor of butcher's valuation has this substance been used profitably. Its effects on the weight of hay have been rather more pronounced, but here also its use has left no profit. It has increased the fescues and Yorkshire fog, but has had little influence on the other plants. The joint report of the butcher and wool-expert is as follows:—"Two very good sheep, others much back. Wool 3lbs. per sheep, like No. 7 as regards quantity and quality."

Plot 10.—The Effects of Dissolved Bones.—This manure (6 cwt. per acre) was applied in the spring of 1897, and contained the same amount of phosphoric acid as the super of Plot 9. As regards nitrogen the dissolved bones have supplied one half as much as the sulphate of ammonia of Plot 9. On the aggregate of the three years the yield of hay of Plots 9 and 10 has been the same, but as the dissolved bones cost less than the mixture of super and sulphate of ammonia the net profit from the former has been greater.

There are no very striking differences in the botanical composition of the herbage.

As in the case of the hay, so in the case of the mutton, the yields from Plots 9 and 10 are identical. The less cost of the dissolved bones has, however, produced a better net return from their use, and this is also borne out by the butcher's valuation. So far, however, the effects do not compare favourably with slag or superphosphate used alone.

The joint report of the butcher and wool-expert is as follows:—"Sheep of fair quality and in good thriving condition, but rather deficient in weight. Three were prime fat. Wool of fine quality, but not abundant—2½ lbs. per sheep."

In the article that appeared in this Journal in December, 1898, attention was called to the fact that the weight of pasture calculated as hay, necessary to give 1 lb. of live-weight increase may vary greatly under different systems of manurial treatment.

In Table IV. the subject is dealt with for the three years the experiment has been in progress. On account of the fact

that the sheep of Plot 1 got cake during two of the seasons the results of that plot do not lend themselves to a comparison of the relationship of hay to mutton. The other plots, however, provide some instructive figures. The slag of Plot 3 increased the aggregate hay crop of the three seasons by 97 per cent., but it increased the yield of mutton by no less than 233 per cent. The smaller dressing of slag on Plot 4 had also relatively more effect on the sheep than on the hay, though in this respect it is far behind Plot 3.

TABLE IV.

RELATIONSHIP OF HAY TO MUTTON, AND OF DEAD WEIGHT TO LIVE WEIGHT.

Plots.	Treatment.	Relationship of Hay to Mutton on the average of three years.			Relationship of Carcase to Live Weight in 1899.		
		Per cent. in excess of Plot 6.		lbs. of Hay to 1 lb. of Live Weight increase.	Average Live Weight.	Average Dead Weight.	Per cent. of Mutton.
		Hay.	Mutton.	lbs.	lbs.	lbs.	%
1	Cake - - -	46	139	21.4	115.5	53.5	46.3
2	Lime - - -	14	4	38.8	—	—	—
3	$\frac{1}{2}$ Ton Slag - -	97	233	20.8	127.0	57.5	45.3
4	$\frac{1}{4}$ Ton Slag - -	68	96	30.1	117.5	53.5	45.5
5	7 Cwt. Super -	47	91	27.0	114.0	53.0	46.5
6	Nothing - - -	—	—	35.1	—	—	—
7	Super + Potash -	28	117	20.6	120.5	53.5	44.4
8	Super + Lime -	48	119	23.6	122.5	54.5	44.5
9	Super + Ammonia -	54	104	26.7	126.0	57.0	45.2
10	Dis. Bones - -	54	104	26.7	122.5	57.0	46.5

Superphosphate combined with potash has increased the hay by only 28 per cent., whereas it has increased the mutton by 117 per cent. The one material that has had less effect on the mutton than on the hay is common lime, so that from no point of view—as tested by definitely ascertained results—has this substance, when used alone, had any beneficial effect.

This subject may be looked at from another standpoint. If we admit that the hay obtained from the sub-plots fairly represents the relative, if not the absolute, amount of herbage produced and consumed as pasture, we may divide

the hay yield by the live-weight yield, and thus ascertain what weight of pasture, reckoned as hay, has been required to give one pound of live-weight increase. In this respect there is nothing to choose between Plot 3 (large dose of slag) and Plot 7 (super and potash). There the pasture-equivalent of about 20½lbs. of hay has increased the live weight of the sheep by 1 lb. Next in order of merit comes Plot 8 (super *plus* lime), after which there does not appear to be a great deal of difference in the feeding properties of the herbage of several plots. At the bottom of the list we find the unmanured plot and the plot getting common lime, 35·1lb. of pasture calculated as hay from the former plot, and 38·8lbs. from the latter, having been required to add 1lb. of live-weight increase to the sheep.

The other portion of Table IV. shows the average live and dead weights of the two sheep taken from certain plots for slaughter. There is not a great deal of difference in the percentages of mutton, which are all low.

Along with the sheep from the plots the butcher removed two sheep from amongst the reserves. The average weight of these animals was 123lbs. live, and 64½lbs. dead, showing a percentage of carcase of 52.4. This proportion of mutton is distinctly higher than in the case of any of the experimental animals, and would indicate that although the close confinement has not interfered with live-weight increase, it has, in another respect, made its influence felt.

The butcher reported on the carcasses of the animals selected for slaughter as follows:—"Reserves are the best mutton. Nos. 1, 3, and 4 are next in order, followed by No. 10. Nos. 5, 7, 8, and 9 are as near alike as need be. As to the whole, they are very much like most of the sheep this dry season—they kill with a want of kidney suet and weigh badly."

While the season's grazing with sheep is the method of testing the results that is most depended on, and is the main feature of the experiments, it may be mentioned that at the end of each summer a considerable amount of food was still present on the plots, and, in this respect, all were not alike. This "roughness" has been utilised by store cattle, with

which the plots were stocked in proportion to apparent requirements, a note being kept of the duration of the respective periods of grazing. The 30½ acres have each autumn maintained 18 breeding cattle for fully two months, and that they found enough to eat is proved by the fact that they came off in excellent condition. Allowing 1s. per head per week for grazing, the plots are credited with sums varying between 10s.

Plot 6 and £1 (Plot 3) per acre. Although this item must ultimately be included in any review of the financial results, it need not receive further attention for the present.

WM. SOMERVILLE.

BULLOCK FEEDING EXPERIMENTS IN NORFOLK.

The Norfolk Chamber of Agriculture has carried out an extensive scheme of experimental work since 1886, and as early as 1887 recognised the importance of turning its attention to the subject of feeding. In that year, the Experiments Committee of the Chamber decided to investigate the question of the value of oil in linseed cake for fattening sheep. Unforeseen circumstances however prevented the experiment being at once satisfactorily carried out, and it was postponed until 1888, when the results were published in the *Journal of the Royal Agricultural Society* (XXV. 407). This experiment was followed by a series of comparative trials of various popular purchased foods and mixtures, the result of which was to demonstrate the superior value of a mixture of equal parts of decorticated cotton cake and crushed barley, in quantities increasing from $\frac{1}{4}$ lb. of the mixture per head per diem at first, to 1 lb. in the later stages of fattening.

The sheep feeding experiments continued until 1894-95, when the Experiments Committee of the Chamber decided to commence a somewhat similar series of bullock feeding experiments, which were accordingly started in the following year, 1895-96, and are still in progress. It is with these bullock feeding experiments, that the present paper is concerned. Throughout the whole series of feeding experiments, the Chamber has been indebted for the means of carrying them out to Mr. Garrett Taylor, who has provided suitable animals, yards and all other necessities. Mr. Henry Giles, the Superintendent of Experiments for the Chamber, has entirely undertaken their practical management and since 1892 the Chamber has entrusted me with the duties of drawing up the

plans for, and reports of the experiments, carrying out the analyses of the foods, and other matters of general supervision. Several of the analyses have also been done by Dr. Voelckes.

The Bullock Feeding Experiments have dealt broadly with two questions:—

(1) The amount of roots which can be profitably fed to bullocks.

(2) Comparative trials of various popular purchased foods.

(1) *The amount of roots which can be profitably fed to bullocks.*

Twenty-one 3-year-old Irish Bullocks were bought on October 26th, 1896. They had been grazing together all the summer in Ireland, and getting, in addition to the grass, about 4 lbs. per head daily of linseed cake. They were prepared for the experiment as follows:—October 26th, to November 11th, bullocks turned out all day and whole swedes thrown to them; brought into yards at night, and given, per head per diem, 2 lbs. linseed cake, 2 lbs. mixed wheat and barley meal (half and half), and hay and straw chaff, and, before being turned out in the morning, as much hay as they would eat.

From November 11th, to November 28th, the turning out during the day was discontinued, cut swedes were substituted for the whole swedes, and the daily ration of cake and meal increased to 3 lbs. of each.

The object of this treatment was to accustom the bullocks to the yards, and to their artificial diet, and to give them plenty of time to recover from the knocking about inseparable from a journey from Ireland to Norwich.

On November 28th, each bullock was weighed, after fasting 24 hours, and tattooed in the ear, and four almost exactly equal lots of five were selected, the odd beast being kept in reserve, though fortunately there was no need to bring him in later, as all the beasts continued to progress steadily throughout the experiment.

Each lot had access to water in a tub in the yard, and it was noticed that Lots I. and II. drank considerable amounts, while Lots III. and IV. drank much more sparingly, especially during the last month.

All the bullocks had per head per diem the following quantities of artificial foods :—October 26th to January 19th 2 lbs. linseed cake (1), 2 lbs. common cotton-cake (2), 2 lbs. crushed wheat, and 2 lbs. crushed barley—in all 8 lbs.—January 13th to February 14th, 10 lbs. per head per diem of the same mixture. Throughout the experiment the beasts were given as much hay and straw-chaff (half and half) as they could eat. The actual amounts eaten, as determined by giving weighed amounts, and weighing what was left over, were as follows :—

Lot I.	—5,805 lbs.,	or per head per diem,	16 lbs.
Lot II.	—3,917 lbs.	„ „ „	11 lbs.
Lot III.	—3,620 lbs.	„ „ „	10 lbs.
Lot IV.	—3,625 lbs.	„ „ „	10 lbs.

The object of the experiment being to determine the most economical daily ration of roots, the following amounts were given per head per diem to the several lots :—

Lot I.	—3 stones=42 lbs.
Lot II.	—6 stones=84 lbs.
Lot III.	—9 stones=126 lbs.
Lot IV.	— <i>Ad libitum</i> .

Lots I. and II. were given the actual amounts stated, which they ate readily and completely throughout the whole time. Lot III. also received the full amount, but did not eat quite all of it, nor could Lot IV. be induced to eat more than about eight stones per head per diem. The exact amounts eaten, as determined by the same method as was used for the chaff, were :—

Lot I.	—1,095 stones=42 lbs.	per head per diem.
Lot II.	—2,175 stones=84 lbs.	„ „
Lot III.	—2,784 stones=107 lbs.	„ „
Lot IV.	—2,955 stones=115 lbs.	„ „

Thus it will be seen that while Lots I. and II. ate the exact amount of roots intended, the amount consumed by Lots III. and IV. did not reach those set forth in the plan of the experiment, in fact the greatest average weight of roots eaten per head per diem was only just one hundred-weight.

The method adopted in portioning out the food was to give

(1) Containing oil, 9.32 per cent., albuminous compounds, 26.34 per cent.

(2) „ 4.22 per cent., „ „ 24.46 per cent.

half the cake, meal, and chaff first thing in the morning, the other half last thing at night; half the roots as soon as most of the morning's dry food was eaten, and the other half in the afternoon.

The roots until January 13th, were swedes only; after this date a small and increasing proportion of mangolds was substituted for part of the swedes, until finally the bullocks were getting two-thirds mangolds, and one-third swedes, at the end of the experiment.

The bullocks were finally inspected when most of them were considered fit to kill, viz., the whole of Lots III. and IV., and all but one bullock in Lot II. Lot I. were not ready and had to be kept on longer. It was decided that all the beasts which were ready should be sold at once, and accordingly the above mentioned 14 beasts were sent to London, where they realised £21 10s. per head, or 34s. per cwt. live-weight.

All the beasts were fasted and weighed on the same day, February 14th, and the experiment concluded.

The complete details of the original, final, and intermediate monthly weighings are given in Table I.

The increase in weight per lot, per head, and per head per diem were as follows:—

Lot.	Increases. Nov. 28 to Dec. 16.			Increases. Dec. 16 to Jan. 13, '96.			Increases. Jan. 13, '96 to Feb. 14.			Total increases.		
	per lot.			per lot.			per lot.			per lot.		
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
I.	158	32	2	208	42	1'6	308	62	2	674	135	1'8
II.	193	39	2'4	244	49	1'8	308	62	2	745	149	2'0
III.	203	41	2'6	261	52	2	296	59	1'9	760	152	2'0
IV.	254	51	3'2	300	60	2'2	269	54	1'7	823	165	2'2

The above explanations and tables contain all necessary information as to the result of the experiment, but these results will be made more obvious by considering each point of interest in somewhat greater detail.

TABLE I.

Original, Final, and Intermediate Monthly Weighings.

No. of lot.	Tattoo No. in ear.	Weight on Nov. 28th, 1895.	Weight on Dec. 16th, 1895.	Weight on Jan. 13th, 1896.	Weight on Feb. 14th, 1896.
		cwts. qrs. lbs.	cwts. qrs. lbs.	cwts. qrs. lbs.	cwts. qrs. lbs.
I.	11	11 3 8	11 3 25	12 1 5	12 2 23
	16	11 1 22	11 3 16	12 0 24	12 2 25
	17	11 1 17	11 3 8	12 0 8	12 2 10
	19	11 0 4	11 1 3	11 3 16	12 2 10
	5	10 1 16	10 2 5	10 3 16	11 2 1
Total weight per lot - -		56 0 11	57 2 1	59 1 13	62 0 13
II.	4	11 3 2	12 1 20	12 3 4	13 2 6
	13	11 1 24	11 3 2	12 0 26	12 3 1
	7	11 0 10	11 1 8	11 3 18	12 2 7
	15	11 0 2	11 1 17	11 3 0	12 0 20
	18	10 2 12	10 3 6	11 0 25	11 2 11
Total weight per lot - -		56 0 0	57 2 25	59 3 17	62 2 17
III.	6	11 2 17	12 0 12	12 2 16	13 0 13
	12	11 1 26	11 3 2	12 1 1	12 3 4
	3	11 0 2	11 2 17	12 0 21	12 3 4
	10	11 0 8	11 1 4	11 2 10	12 0 10
	14	10 2 14	11 0 0	11 1 25	12 0 2
Total weight per lot - -		56 0 1	57 3 8	60 0 17	62 3 5
IV.	21	11 2 21	12 0 10	12 3 5	13 2 7
	9	11 1 21	11 3 6	12 1 6	12 2 13
	8	11 2 7	11 3 24	12 1 24	12 3 8
	1	10 2 19	11 1 0	11 2 17	12 0 9
	20	10 2 16	11 0 20	11 2 25	12 1 3
Total weight per lot - -		56 0 0	65 1 2	60 3 22	63 1 11

The statement below shows the daily ration and dry matter contained in it, compared with average daily increase per head.

Lot.	Average daily ration.			Dry matter in			Total dry matter.	Average increase per head per diem.	Percentage of dry matter of food converted to beef.
	Chaff.	Roots.	Cake, and Meal.	Chaff.	Roots.	Cake, and Meal.			
I.	lbs. 16	lbs. 42	lbs. 8·8	lbs. 13·7	lbs. 4·7	lbs. 7·8	lbs. 26·2	lbs. 1·8	lbs. 6·9
II.	11	34	8·8	9·6	9·3	7·8	26·7	2·0	7·5
III.	10	107	8·8	8·6	11·9	7·8	28·3	2·0	7·1
IV.	10	115	8·8	8·6	12·6	7·8	29·0	2·2	7·6

The above figures bring out the following points:—

- (1) The amount of dry matter consumed increased steadily with the proportion of roots in the diet, in spite of the beasts having free access to water. With the smaller allowances of roots they would not eat enough chaff to bring the daily consumption of dry matter up to the amount taken in Lots III. and IV.
- (2) In addition to the larger allowance of roots inducing the beasts to consume more dry matter, it also enabled them to convert a greater proportion of the dry matter consumed into beef. Thus, with a daily ration of 8 stones of roots, 7·6 per cent. of the dry matter of the food was converted into beef, as against 6·9 per cent. when the daily allowance of roots was only 3 stones.

The Norfolk practice of giving bullocks all the roots they will eat appears, therefore, to be an economical one, as it leads to a large consumption of dry matter, a high percentage of which is converted into beef.

Comparison of economy of feeding with small and large rations of roots.

The statement below is made out from the following data:—
 Cost per ton of linseed cake, £6 10s.; of common cotton cake, £4 7s. 6d., of mixed hay and straw chaff, £2 10s.; of roots, 7s.; cost of wheat and barley meal, 8d. per stone; 5s. per ton allowed for carriage, etc., of the cakes. These amounts were

actually paid for the purchased foods at the time when the experiment was carried out. The charge for attendance is also the actual amount paid to the man who looked after the beasts, and is considerably higher than it would be in ordinary practice, as in order to avoid all chance of accidental complications, the man's whole time was engaged in attending to the experimental beasts. The value of the bullocks at the commencement of experiment was £16 5s. per head, and their value at the end of the experiment is calculated at 34s. per cwt. live-weight, the price actually realised by those sold.

	Lot I.	Lot II.	Lot III.	Lot IV.
Original cost of 5 bullocks -	£ s. d. 83 15 0	£ s. d. 83 15 0	£ s. d. 83 15 0	£ s. d. 83 15 0
Cost of cake and meal -	8 1 6	8 1 6	8 1 6	9 1 6
Cost of roots - - -	2 8 0	4 16 0	6 1 8	6 9 0
Cost of chaff - - -	6 9 6	4 7 6	4 0 9	4 1 0
Cost of attendance - -	1 14 8	1 14 8	1 14 8	1 14 8
Total cost per lot - -	102 8 8	102 14 8	103 13 7	104 1 2
Value of 5 bullocks at 34s. per cwt., live weight)	105 12 0	106 10 0	106 16 0	107 14 0
Profit on feeding - - -	3 3 4	3 15 4	3 2 5	3 12 10

The above figures would seem to indicate that the difference in the actual profit produced is very small, for while the large rations of roots produced greater live weight, the cost of feeding was almost proportionately greater. There is nevertheless a slight balance of profit in favour of the larger root rations, and to this must be added the fact mentioned before that the five bullocks in Lot I. and one of those in Lot II., are valued as if they had been fat as soon as the others, while as a matter of fact they were actually not ready to kill for some time later.

Taking this last consideration into account, the larger root rations must be considered to be more economical than the smaller.

The Butcher's Opinion.

All the experimental bullocks were sold to the same London salesman, who had them slaughtered at the same place, and furnished a report on the various lots. His

report on Lots III. and IV., and the first instalment of Lot II., which he took first, was that they were prime Norfolk beef; while he reported that Lot I., and the single beast out of Lot II., which went up later, did not kill nearly so well in spite of the longer period of feeding, and that he could not believe they were real Norfolk-fed beasts.

The results of the experiment, therefore, whether looked at from the point of view of getting most beef from least dry matter in the food, or from the £ s. d. standpoint, or from the practical verdict of the butcher, point clearly to the economy of the Norfolk practice of giving to fattening bullocks all the roots they will eat.

(2).—*Comparative Trials of Various Popular Purchased Foods.*

The investigation as to the greatest amount of roots which can profitably be fed to bullocks having been satisfactorily carried out during the winter of 1895-6, and the results having, from every point of view, confirmed the usual Norfolk practice of giving the beasts all the roots they will eat, the Experiments Committee of the Chamber decided to turn their attention to the carrying out of a series of comparative trials of various commonly-used purchased foods. This series of experiments was accordingly commenced in the winter of 1896-7, and has been continued each succeeding year up to the present; and, as the results have been satisfactorily uniform, I have been requested to draw up the final report on the series of three years' experiments, and to take steps for the commencement next year of a new series, dealing with the feeding-value of roots grown with dung, as compared with those grown with various artificial manures. As before, the experiments described in the present report have been carried out under the direct supervision of Mr. Henry Giles, and the beasts, yards, and other requisites have been provided by Mr. Garrett Taylor.

In the description of the 1895-6 experiment, details were given of the method of ensuring a level lot of bullocks; and as practically the same procedure has been followed in each succeeding year, it will suffice here to state that in 1896-7.

and 1897-8, two-year-old dishorned Irish cattle were the subject of the experiment; while in 1898-9 Norfolk red polled bullocks were provided, half of which were thirteen, the other half eighteen, months old.

The plan of the experiments has been to give 1 cwt. of roots and 10 lb. mixed hay and straw chaff per head per diem, and to supplement this with the purchased foods under trial. The Irish beasts, in the first two years of the experiment, consumed the whole of the roots; but the smaller and younger red polls only got through about $7\frac{1}{2}$ stone per head per diem, instead of the eight stone allowed them.

The full allowance of 10 lbs. of chaff was not consumed any year, the average amount eaten per head per diem being only 8 lbs. In each experiment the roots used to start with consisted entirely of swedes, which, after about half the time, were gradually replaced by mangolds, as in 1895-6.

Four lots, each of five bullocks, have been used in each year, and, on the whole, the casualties have fortunately been very few. In 1897-8 and 1898-9, the whole of the beasts kept in good health throughout; while in 1896-7 one beast in each lot did badly, the causes being in the case of Lot. II, tuberculous liver; Lot III., abscesses in the scrotum; and in Lots I. and IV., some disorder which was not identified definitely, but which was in no way due to the food. Accordingly, the results for this year are worked out for the four sound beasts in each lot, and, when necessary for purposes of comparison, increased by one-fourth.

The statements given below show the exact rations of purchased food consumed per head per diem by each lot in each year.

From them it will be seen that the general arrangement of the rations was as follows:—

Lot I. received, in addition to roots and chaff, linseed cake alone each year.

Lot II. received the same amount of a mixture of linseed cake and common cotton cake each year.

Lot III. always got decorticated cotton cake, but the first

year this was supplemented by maize meal, which was changed in the last two years to dried grains.

Lot IV. has been fed differently each year, in order to investigate various side issues which have arisen in the course of the experiments.

The rations per head, per diem, in 1896-7 and 1897-8 are shown below :—

Rations 1896-7.

Description of Food.		Nov. 2 to Nov. 29.	Nov. 30 to Dec. 27.	Dec. 28 to End of expt.
		lbs. per head per diem.	lbs. per head per diem.	lbs. per head per diem.
Lot I.	Linseed cake - - - - -	6	8	10
Lot II.	{ Linseed cake - - - - -	3	4	5
	{ Common cotton cake - - -	3	4	5
Lot III.	{ Decorticated cotton cake - -	3	4	5
	{ Maize meal - - - - -	3	4	5
Lot IV.	{ Linseed cake - - - - -	1½	2	2½
	{ Common cotton cake - - -	1½	2	2½
	{ Maize meal - - - - -	1½	2	2½
	{ Dried grains - - - - -	1½	2	2½

Rations 1897-8.

Description of Food.		December 13 to January 9.	January 10 to February 6.	February 7 to end of experiment.
		lbs. per head per diem.	lbs. per head per diem.	lbs. per head per diem.
Lot I.	Linseed cake - - - - -	6	8	10
Lot II.	{ Linseed cake - - - - -	3	4	5
	{ Common cotton cake - - -	3	4	5
Lot III.	{ Decorticated cotton cake - -	3	4	5
	{ Dried grains - - - - -	3	4	5
Lot IV.	{ Linseed cake - - - - -	2	2½	3½
	{ Common cotton cake - - -	2	2½	3½
	{ Maize meal - - - - -	2	2½	3½

Rations 1898-9.

Description of Food.	Oct. 28 to Nov. 27.	Nov. 28 to Dec. 11.	Dec. 12 to Dec. 25.	Dec. 26 to Jan. 22.	Jan. 23 to end of ex- periment.
	lbs per head per diem.	lbs per head per diem.	lbs per head per diem.	lbs per head per diem.	lbs per head per diem.
Lot I. Linseed cake - - -	6	8	8	10	10
Lot II. {	Linseed cake - - -	3	4	4	5
	Common cotton cake - -	3	4	4	5
Lot III. {	Decorticated cotton cake -	3	4	4	5
	Dried grains - - -	3	4	4	5
Lot IV. {	Linseed cake - - -	3	4	6	7½
	Common cotton cake - -	3	4	2	2½

The chemical composition of the purchased foods used is shown in the following statements:—

Analyses 1896-97.

	Maize meal.	Common Cotton cake.	Decorticated Cotton Cake.	Linseed Cake.	Dried Grains.
Water- - -	13'35	14'50	9'33	12'10	10'11
Oil - - -	5'54	5'00	9'94	9'31	6'75
Albuminoids -	11'59	23'90	42'87	34'76	18'56
Carbohydrates -	65'47	27'42	26'12	30'94	39'57
Fibre - - -	2'73	23'73	4'20	7'00	20'13
Ash - - -	1'32	5'45	7'54	5'89	4'88
	100'00	100'00	100'00	100'00	100'00

Analyses 1897-98.

	Decorticated Cotton Cake.	Common Cotton Cake.	Linseed Cake.
Water - - - -	8'2	12'7	11'5
Oil - - - -	10'2	6'5	12'3
Albuminoids - - -	41'9	22'5	32'5
Carbohydrates - - -	26'6	33'4	31'3
Fibre - - - -	5'9	19'5	6'6
Ash - - - -	7'2	5'4	5'8
	100'0	100'0	100'0

The cakes used in 1898-9 were selected from several samples analysed, so as to have a composition practically iden-

tical with those used in 1897-8. The maize meal and dried grains used in 1897-8 and 1898-9 may also be taken as practically identical with those used in 1896-7.

The prices per ton of the several descriptions of food were as under :—

Prices per Ton.

Description of Food.	1896-7	1897-8	1898-9
	£. s. d.	£. s. d.	£. s. d.
Linseed cake - - - - -	6 2 6	6 17 6	8 0 0
Common cotton cake - - - - -	4 10 0	4 17 6	5 5 0
Decorticated cotton cake - - - - -	5 17 6	6 10 0	6 10 0
Maize meal - - - - -	4 13 4	4 13 4	— — —
Dried grains - - - - -	4 2 6	4 2 6	4 8 0
Hay and straw chaff - - - - -	2 10 0	2 10 0	2 10 0
Roots - - - - -	7 0	7 0	7 0

The steady rise in price of all the purchased foods is very noticeable ; linseed cake, however, has gone up much more than any of the other foods. In calculating the cost of the foods per lot and per head in the tables given below, 5s. per ton is added to the price of the cakes, and 2s. 6d. per ton to that of the dried grains to allow for cost of cartage, grinding, etc. The prices given for the chaff and roots, on the other hand, are estimated to be their values when cut and ready to be given to the beasts.

Below are given the complete tables of weighings for each of the three years. The first and final weighings are in every case “fasted live weights,” and this is also the case for every weighing in the first two years, while in 1898-9 the weighings during the progress of the experiment are not “fasted live weights,” but are, nevertheless, strictly comparable with each other, having been all taken at the same time of day and the same interval after a meal. These intermediate weighings serve only to indicate the relative progress of the various lots, and it was thought that the method adopted would give all the necessary information, and disturb the progress of the beasts less, than would the taking of their “fasted” weights.

There is also another point of difference from the experiment of 1895-6. Instead of terminating the experiment when the majority of the beasts were ready, and assessing the value of each lot from the actual price obtained for the beasts sold the beasts were sold as they were ready to be killed, their "fasted live weight" and carcase weight determined on the day of killing, and the price calculated from the carcase weight.

Weights of Bulls. 1896-7.

No. of lot.	Weight on Nov. 2nd.	Weight on Nov. 28th.	Weight on Jan. 4th.	Weight on Jan. 25th.	Weight on Feb. 18th.	Weight on Feb. 23rd.	Weight when killed.	Date when killed.	Carcase weight.
	ct. qr. lb.	ct. qr. lb.	ct. qr. lb.	ct. qr. lb.	ct. qr. lb.	ct. qr. lb.	ct. qr. lb.	March	st. lb.
I.	9 0 21	9 3 14	10 3 7	11 0 14	11 1 17	11 2 7	11 3 16	10	55 3
	9 1 14	9 2 7	10 3 7	11 1 0	11 3 2	12 0 0	11 2 25	3	56 6
	9 3 0	10 1 7	11 0 18	11 3 0	12 0 7	11 3 24	12 0 0	17	59 4
	8 2 0	9 0 14	10 0 0	10 1 20	10 2 14	10 3 9	11 0 14	31	51 10
	*36 3 7	38 3 14	42 3 4	44 2 6	45 3 12	46 1 12	46 2 27	—	222 9
II.	8 2 14	9 1 0	10 0 9	10 1 24	10 2 0	10 2 22	10 3 0	17	47 9
	9 2 21	10 0 14	11 0 12	11 1 14	11 2 23	11 3 9	11 3 3	3	55 9
	9 0 21	9 2 14	10 1 20	10 3 9	10 3 14	11 0 2	11 0 24	10	50 12
	9 0 14	9 3 0	10 0 16	10 3 16	10 3 21	11 0 0	10 3 21	24	53 11
	†36 2 14	38 3 0	41 3 1	43 2 7	44 0 2	44 2 5	44 2 20	—	207 13
III.	9 2 21	10 2 14	11 0 10	11 2 10	11 3 0	11 3 15	11 3 21	3	57 7
	9 0 4	9 1 14	9 3 21	10 1 4	10 1 14	10 1 18	10 1 18	24	50 3
	9 0 14	9 3 14	10 3 7	11 1 21	11 1 24	11 2 7	11 3 0	10	56 11
	9 1 21	10 0 0	10 3 3	11 1 8	11 1 14	11 1 23	11 1 21	17	53 7
	‡37 1 4	39 3 14	41 2 13	44 2 15	44 3 24	45 1 7	45 2 4	—	218 0
IV.	8 3 7	9 2 14	10 1 17	10 3 0	10 3 18	10 3 18	11 0 0	17	51 1
	9 0 21	10 0 7	10 2 9	11 0 20	11 1 18	11 1 10	11 1 21	3	54 4
	9 2 14	10 0 14	11 1 2	11 3 0	11 3 14	12 0 6	12 1 3	10	58 0
	9 2 7	10 0 0	11 0 1	11 1 3	11 1 21	11 2 9	11 2 20	31	54 6
	§37 0 21	39 3 7	43 1 1	44 3 13	45 2 25	45 3 15	46 1 16	—	217 11

* One beast was left out on account of general illness.

† One beast was left out on account of having tuberculous liver.

‡ One beast was left out on account of abscesses in scrotum

§ One beast was left out on account of general illness.

In 1897-98, as in 1896-97, the intermediate, as well as the first and final weights shown are in every case, 'as stated above, "fasted live weights."

Weights of Bullocks. 1897-8.

Lot No.	Weight on Dec. 13.	Weight on Jan. 10.	Weight on Feb. 7.	Weight on March 7.	Weight on day before killing.	Date when killed.	Carcass Weight.
1	cwt. qrs. lb.	cwt. qrs. lb.	cwt. qrs. lb.	cwt. qrs. lb.	cwt. qrs. lb.		st. lb.
	9 2 26	10 1 14	10 1 18	10 3 0	11 1 8	May 3	55 13
	10 0 20	10 0 16	10 2 24	13 3 6	11 3 14	March 15	56 11
	10 1 20	10 2 12	11 0 4	11 1 0	11 2 3	April 18	56 7
	9 0 7	9 2 15	10 0 22	11 0 0	11 2 10	April 25	58 0
	9 3 15	10 2 4	11 0 16	11 3 10	11 3 25	March 16	53 0
	49 1 4	51 0 23	53 2 0	56 2 16	58 1 9		280 3
2	10 0 16	11 0 4	11 1 15	11 3 20	11 3 7	March 16	54 0
	9 1 24	10 0 14	10 2 16	11 0 6	11 2 24	April 25	55 11
	9 2 24	10 0 13	10 2 8	10 3 25	11 0 22	May 3	
	9 3 25	10 1 3	10 2 18	10 3 20	11 1 0	March 15	52
	10 0 0	10 1 21	10 2 25	11 0 9	11 1 12	April 18	54 4
	49 1 5	52 0 1	53 2 26	55 3 24	57 1 9		270 0
3	9 0 12	9 2 24	9 3 20	10 0 21	10 1 11	May 3	51 7
	10 1 22	11 0 0	11 1 12	12 0 9	12 0 0	March 16	58 4
	9 2 26	10 0 17	10 2 0	11 0 0	11 0 12	April 25	53 1
	9 3 11	10 1 5	10 2 10	11 0 23	11 1 20	April 18	54 9
	10 0 16	10 2 5	10 3 6	11 2 0	11 1 20	March 15	53 11
	49 1 3	51 2 23	53 0 20	55 3 25	56 1 7		271 4
4	9 2 6	10 0 4	10 1 12	10 3 0	10 2 16	March 16	51 13
	10 0 22	10 2 15	11 0 8	11 2 13	11 3 16	April 18	57 6
	9 0 14	9 3 7	10 1 10	10 3 22	11 2 6	April 25	55 6
	10 1 12	10 1 20	10 2 10	11 0 27	11 2 8	May 3	50 0
	10 0 4	10 2 16	11 0 24	11 3 22	11 2 10	March 15	54 8
	49 1 2	51 2 6	53 2 8	56 2 0	57 1 0		274 5

In the following statement for 1898-9 the first and final weights are "fasted live weights;" the intermediate weights are not "fasted live weights," but are, nevertheless, for the reasons already stated, comparable with each other.

Weights of Bullocks. 1898-9.

Lot No.	Fasted weight on Oct. 27.	Weight on Oct. 31.	Weight on Nov. 28.	Weight on Dec. 27.	Weight on Jan. 23.	Weight on Feb. 20.	Weight on March 6.	Fasted weight when killed.	Date when killed.	Carcass weight.
	ct. qr. lb.	ct. qr. lb.	ct. qr. lb.	ct. qr. lb.	ct. qr. lb.	ct. qr. lb.	ct. qr. lb.	ct. qr. lb.		st. lb.
1	9 0 6	9 1 3	9 2 7	10 1 5	10 3 0	11 0 14	11 0 0	11 2 8	Apr. 22	54 2
	8 3 6	9 1 24	9 3 2	10 2 7	11 0 25	11 3 8	11 3 9	12 0 20	Apr. 5	56 11
	6 1 1	6 1 16	6 2 8	7 0 9	7 3 5	7 3 13	8 0 2	8 1 8	Apr. 12	38 5
	8 1 26	8 3 12	9 2 0	10 1 0	10 2 24	11 0 4	11 0 7	11 1 12	Mar. 21	53 10
	7 3 20	8 2 4	9 0 4	9 2 26	10 2 9	11 0 0	10 3 21	10 3 8	Mar. 14	53 3
	40 2 3	42 2 3	44 1 21	47 3 19	51 0 7	52 3 11	52 3 11	54 1 0		253 3
2	6 2 4	6 3 0	7 1 24	8 0 0	8 2 12	8 2 25	8 2 0	9 1 2	Apr. 12	40 10
	8 0 1	8 1 15	8 3 12	9 2 10	10 0 12	10 2 11	10 2 0	10 2 10	Mar. 14	48 3
	9 2 21	9 3 0	9 3 7	10 1 21	11 0 11	11 1 7	11 0 2	11 1 10	Mar. 21	54 1
	8 0 5	8 1 24	8 2 22	9 0 9	9 3 17	10 0 7	9 3 2	10 0 22	Apr. 5	47 1
	8 0 25	8 2 8	9 0 24	9 3 0	10 1 24	11 2 0	10 2 17	11 1 10	Apr. 22	49 8
	40 2 0	41 3 19	44 0 5	46 3 12	50 0 20	52 0 22	50 1 21	52 2 26		239 9
3	8 2 24	8 3 22	9 2 5	10 0 0	10 1 24	10 3 11	10 3 2	10 3 6	Mar. 14	50 0
	6 3 12	7 0 10	7 2 4	8 0 9	8 3 0	8 3 5	8 3 13	9 1 24	Apr. 12	43 5
	8 2 3	9 0 13	8 3 23	9 1 18	9 3 0	9 3 26	9 0 15	10 1 14	Apr. 22	47 6
	7 3 4	8 1 24	9 0 0	9 2 17	10 1 0	10 2 18	10 0 20	10 2 4	Apr. 5	47 10
	8 2 14	9 1 2	9 2 8	10 1 0	10 3 17	11 0 3	11 0 2	11 0 12	Mar. 21	51 4
	40 2 1	42 3 15	44 2 12	47 1 16	50 0 13	51 1 7	49 3 24	52 1 4		239 11
4	7 2 22	7 3 12	8 0 14	8 2 11	9 0 16	9 1 12	9 1 12	9 2 14	Mar. 21	45 13
	8 0 4	8 2 0	8 3 4	9 1 11	9 3 25	9 3 22	9 3 13	10 1 10	Apr. 12	49 2
	8 2 14	8 3 25	9 1 0	9 3 6	10 3 4	10 3 0	10 2 2	10 2 14	Mar. 14	50 10
	7 1 0	7 1 17	7 2 2	7 3 7	8 0 27	8 1 0	8 0 22	8 3 4	Apr. 22	39 11
	8 3 18	9 0 1	9 0 22	9 2 16	10 1 18	10 2 0	10 2 26	11 0 10	Apr. 5	53 8
	40 2 2	41 2 27	42 3 14	45 0 23	43 2 6	48 3 6	48 2 19	50 1 24		239 2

The following summary of the weighings, giving only the actual increases produced for each lot each year, contains in shorter form most of the information in the above complete tables. The periods between consecutive weighings are generally a month; their exact length is given in all cases.

Increases produced per lot.

1896-7. 4 bullocks.	1ST PERIOD. 26 days.	2ND PERIOD. 37 days.	3RD PERIOD. 21 days.	4TH PERIOD. 24 days.	5TH PERIOD. Average 25 days.	6TH PERIOD.	TOTAL. In about 5 months.
	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.		cwt. qr. lb.
Lot I. - - -	2 0 7	3 3 18	1 3 2	1 1 6	0 2 15	—	9 3 20
Lot II. - - -	2 0 14	3 0 1	1 3 6	0 1 23	0 2 18	—	8 0 6
Lot III. - - -	2 2 10	1 2 27	3 0 2	0 1 9	0 2 8	—	8 1 0
Lot IV. - - -	2 2 14	3 1 22	1 2 12	0 3 12	0 2 19	—	9 0 23
1897-8. 5 bullocks.	128 days.	28 days.	28 days.	Average 33 days.			About 4 months.
	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.			cwt. qr. lb.
Lot I. - - -	1 3 19	2 1 5	3 0 16	1 2 21	—	—	9 0 5
Lot II. - - -	2 2 27	1 3 22	1 3 26	1 1 13	—	—	8 0 4
Lot III. - - -	2 1 20	1 1 25	2 3 5	0 1 10	—	—	7 0 4
Lot IV. - - -	2 1 4	2 0 2	2 3 20	0 3 0	—	—	7 3 26
1898-9. 5 bullocks.	28 days.	28 days.	28 days.	28 days.	14 days.	Average 27 days.	About 5½ months.
	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.
Lot I. - - -	3 3 18	3 1 26	3 0 16	1 3 4	0 0 0*	1 1 17	13 2 25
Lot II. - - -	3 2 5	2 3 7	3 1 8	2 0 2	1 3 1*	2 1 5	12 0 26
Lot III. - - -	4 0 11	2 3 4	2 2 25	1 0 22	1 1 11*	2 1 8	11 3 3
Lot IV. - - -	2 1 12	2 1 9	3 1 11	0 1 0	0 0 15*	1 3 5	9 3 22

* Decreases.

These increases can be more readily compared when expressed in lbs. per head per diem, as below :—

Increases in lbs. per head per diem.

Lot No.	Purchased Food.	First Period.	Second Period.	Third Period.	Fourth Period.	Fifth Period.	Sixth Period.	Whole experi- ment.	Average of the three years.
I.	{ Linseed cake, 1896-97	2'22	2'96	2'36	1'52	7'1	—	2'09	} 1'94
	{ „ „ 1897-98	1'53	1'83	2'51	1'14	—	—	1'57	
	{ „ „ 1898-99	3'12	2'78	2'51	1'43	0'0	1'16	1'73	
II.	{ Linseed cake and common cottoncake, 1896-97.	2'29	2'27	2'40	'53.	'74	—	1'66	} 1'68
	{ Linseed cake and common cottoncake, 1897-98.	2'19	1'56	1'59	'93	—	—	1'56	
	{ Linseed cake and common cottoncake, 1898-99.	2'83	2'25	2'65	1'61	2'81*	1'90	1'74	

Increases in lbs. per head per diem (continued).

Lot No.	Purchased Food.	First Period.	Second Period.	Third Period.	Fourth Period.	Fifth Period.	Sixth Period.	Whole experiment.	Average of the three years.
III.	Decort. cotton cake and maize meal, 1896-97.	2'79	1'31	4'03	'38	*64	—	1'70	1'61
	Decort. cotton cake and dried grains, 1897-98.	1'94	1'17	2'23	'23	—	—	1'34	
	Decort. cotton cake and dried grains, 1898-99.	3'27	2'23	2'10	'95	2'16*	1'92	1'69	
IV.	Linseed cake, common cotton cake, dried grains, and maize meal, 1896-97.	2'83	2'60	2'14	1'0	'75	—	1'91	
	Linseed cake, common cotton cake and maize meal, 1897-98.	1'83	1'61	2'34	'50	—	—	1'53	
	Linseed cake and common cotton cake at start, 1898-99.	1'88	1'86	2'67	'20	*20*	1'49	1'41	

* Decreases.

Relation between Dry Matter of Food and Increase Produced.

By adding together all the food eaten during the three experiments, calculating the weight of dry matter contained in the food of each lot, and comparing these numbers with the increased weights in each case, the following figures are obtained :—

Lot.	Purchased Food.	Total Dry matter Consumed.	Total Increase.	Increase per 100 lbs. dry matter consumed.
		cwt.	cwt. qr. lbs.	—
I.	Linseed cake - - - -	465	32 2 22	7'04
II.	Linseed cake and common Cotton cake - - - - -	466	28 1 8	6'08
III.	Decorticated Cotton cake with Maize meal in '95-7, dried grains in '97-8 and '98-9 - -	467	27 0 7	5'80

Comparing these three lots, linseed cake comes out with a great advantage, the beasts getting linseed cake having made the greatest increase per head per diem—on the average, 1'94 lbs. against 1'68 and 1'61 for Lots II. and III. respectively. Besides giving the largest daily increase,

linseed cake has caused the bullocks to convert a greater proportion of their food into beef, so that practically the same amount of food has given considerably more beef when linseed cake formed part of the diet than when any other concentrated food was used. From the point of view, therefore, of the absolute increase produced by the feeding, linseed cake alone, as an addition to the usual Norfolk diet of chaff and roots, has shown in each of three years a decided advantage over each of the mixtures which have been tried.

Comparison of the Various Concentrated Foods from the Point of view of Economy.

The Table on the next page shows the financial result of the feeding of each lot of bullocks in each year, the prices of the cake, etc., used in the calculation being those given in the preceding table as current at the time of each experiment. The bullocks were killed when ready, and sold by carcase weight. The manurial values are calculated from Sir J. B. Lawes' and Sir J. H. Gilbert's tables of compensation values (*R.A.S.E. Journal*, 1897. IV.) The charges for attendance are those actually paid, and are considerably higher than they would be in practice, on account of the extra labour involved in weighing out accurately all the foods, and attending to other details.

Adding up the figures for the three years in the cases of Lots I., II., III., where the foods were comparable throughout, it appears that the result of the feeding of the total fourteen bullocks which have been experimented on in each lot during the three years is:—

14	Bullocks fed as in Lot I.	-	-	-	profit	£4	10s.	10d.
14	„ „ „ „ II.	-	-	-	loss	£3	12s.	0d.
14	„ „ „ „ III.	-	-	-	profit	£7	5s.	11d.

Thus, while, as shown before, linseed cake has caused the greatest rate of increase in every case, the mixture of decorticated cotton cake and maize meal, or dried grains, used in Lot III., has from a money point of view paid best, and this result is confirmed by the six years' experiments in sheep feeding which the Chamber had carried out before commencing their work in bullock feeding. In the sheep feeding

experiments the mixture of equal parts of decorticated cotton cake and crushed barley gave on several occasions the highest rate of increase, and on every occasion the most economical result.

Financial Results of Feeding.

	Lot I.	Lot II.	Lot III.	Lot IV.
1895-7.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Cost of four bullocks, at £13 per head	52 0 0	52 0 0	52 0 0	52 0 0
Cost of roots	8 17 6	8 17 6	8 17 6	8 17 6
Cost of chaff	4 11 7	4 11 7	4 11 7	4 11 7
Cost of purchased food	12 6 5	11 2 0	10 15 6	10 0 2
Cost of attendance	2 4 0	2 4 0	2 4 0	2 4 0
Total cost of the four fat bullocks	79 19 6	78 15 1	78 8 7	77 13 3
Value, as sold at 7s. 6d per stone	83 10 0	77 19 6	81 15 0	81 13 6
Manurial value of food	5 2 0	4 18 0	4 16 0	4 9 6
Total return per lot	88 12 0	82 17 6	86 11 0	86 3 0
Profit on the four bullocks	8 12 6	4 2 5	8 2 5	8 7 9
1897-8.				
Cost of five bullocks, at £14 per head	70 0 0	70 0 0	70 0 0	70 0 0
Cost of roots	10 4 9	10 4 9	10 4 9	10 4 9
Cost of chaff	6 10 7	6 10 7	6 10 7	6 10 7
Cost of purchased food	15 18 7	13 13 11	12 5 5	12 12 1
Cost of attendance	3 11 3	3 11 3	3 11 3	3 11 3
Total cost of the five fat bullocks	106 5 2	104 0 6	102 12 0	102 18 8
Value, as sold at 7s. per stone	98 1 6	94 10 0	94 19 0	96 0 6
Manurial value of food	6 5 4	5 17 8	5 18 9	5 5 7
Total return per lot	104 6 10	100 7 8	100 17 9	101 6 1
Loss on the five bullocks	1 18 4	3 12 10	1 14 3	1 12 7
1898-9.				
Cost of five bullocks, at £12 6s. per head	61 10 0	61 10 0	61 10 0	61 10 0
Cost of roots	13 1 0	13 1 0	13 1 0	13 1 0
Cost of chaff	7 0 0	7 0 0	7 0 0	7 0 0
Cost of purchased food	25 12 0	21 6 8	17 10 6	24 1 8
Cost of attendance	4 15 0	4 15 0	4 15 0	4 15 0
Total cost of the five fat bullocks	111 18 0	107 12 8	103 16 6	110 7 8
Value, as sold at 2s. per stone	101 5 8	95 17 1	95 18 3	95 13 1
Manurial value of food	8 9 0	7 14 0	8 16 0	8 7 0
Total return per lot	109 14 8	103 11 1	104 14 3	104 0 1
Profit + or loss - on the five bullocks	-2 3 4	-4 1 7	+0 17 9	-6 7 7

This falling behind of the linseed cake when the question is reduced to £ s. d. is due to the great increase in the price of that food during the last three years. Should the price fall again to something like £6 per ton, linseed cake would probably again become the most profitable food to buy for fattening bullocks, as it was in the experiment in 1896-97. This is shown by the following table, which shows the figures for Lot I. for 1898-9 as before, but with linseed cake at £6 per ton instead of £8.

	£	s.	d.
Cost of five bullocks at £12 6s. per head	-	-	-
Cost of roots	-	-	-
Cost of chaff	-	-	-
Cost of linseed cake	-	-	-
Cost of attendance	-	-	-
Total cost of the five fat bullocks	105	18	0
Value as sold at 8s. per stone	101	5	8
Manurial value of food	8	9	0
Total return per lot	109	14	8
Profit on the five bullocks	£3	16	0

The main conclusions of the series of experiments therefore are that : Linseed cake appears to be the best food to buy for fattening bullocks, so far as the actual production of beef is concerned, but that at present prices a mixture of decorticated cotton cake and some less expensive article such as dried grains or maize meal is more economical.

Looking back at the table of increases per head per diem on page 326, it is evident that while in 1896-7 and 1897-8, common cotton cake in Lot II. gave a very poor result, when used with linseed cake throughout the experiment, yet the beasts eating it always started very well, and only fell off in the later stages of feeding.

Accordingly it was decided in 1898-9 to feed Lot IV. with equal parts of linseed and common cotton cake to start with, but to gradually decrease the latter and finish the beasts with linseed cake alone. This suggested itself as likely to succeed, both from the results obtained in Lot II., as quoted above in the experiments of 1896-7 and 1897-8, and from the fact that many feeders make this method their common practice. The results, however, obtained in 1898-9 were most unsatisfactory,

and even when used in this way the use of common cotton cake has been most unprofitable.

We must therefore add to the general conclusions, that while linseed cake alone, and decorticated cotton cake as part of a mixture, have given good results when fed to bullocks, the use of common cotton cake has been throughout the experiment most unprofitable.

The Carcase Weights.

It may be of interest to record the carcase weights, and their relation to the live weights, of the beasts fed on each of the foods which have been tried. These are accordingly given in the following table, having been calculated from the figures for fasted live weight when killed, and carcase weight given

LOT I. Carcase Weight as per cent. of Live Weight. <i>1896-7.</i>	LOT II. Carcase Weight as per cent. of Live Weight. <i>1896-7.</i>	LOT III. Carcase Weight as per cent. of Live Weight. <i>1896-7.</i>	LOT IV. Carcase Weight as per cent. of Live Weight. <i>1896-7.</i>
58.30 60.16 61.75 58.05	55.39 59.05 56.68 61.46	60.20 60.29 60.44 58.46	59.65 59.32 59.55 58.25
59.56	58.14	59.85	59.19
<i>1897-8.</i>	<i>1897-8.</i>	<i>1897-8.</i>	<i>1897-8.</i>
61.75 59.77 61.03 62.55 55.33	57.14 59.53 59.72 58.25 59.74	62.20 60.70 59.72 59.76 52.82	60.94 60.36 59.97 59.41 58.85
60.09	58.88	59.04	59.91
<i>1898-9.</i>	<i>1898-9.</i>	<i>1898-9.</i>	<i>1898-9.</i>
58.48 58.28 57.61 56.70 58.00	54.91 58.10 59.60 57.70 54.64	57.85 57.26 57.14 56.61 58.18	59.64 59.41 60.16 56.60 60.38
57.81	56.99	57.41	59.24
Average of the three years. 59.10	57.99	58.69	59.46

THE HOP SUPPLY OF THE UNITED KINGDOM.

The demand for hops in the United Kingdom is one that has always been met for the most part by the home production, and the proportion of our supplies received from abroad has been maintained, on the whole, at a fairly constant level for some thirty years past. As a rule, in normal years the imports of hops form about a quarter or a third of the total supply available for consumption, although every now and then years of unusual abundance or scarcity form exceptions. But, speaking generally, both imports and exports have shown but little tendency to increase or decrease during the period named, though there have often been considerable variations as between one year and another.

Particulars of the area, production, and trade of hops in the United Kingdom, up to the year 1889, are given in the Appendix to the Evidence before the Select Committee on the Hop Industry in 1890.* The main purpose of the appointment of that Committee was to inquire into the causes which had produced the steady decrease in the acreage of land under hop cultivation. The earliest records appearing in the *Agricultural Returns*† show that the area so utilised exceeded 64,000 acres in 1867; from which it increased fairly steadily until a maximum of 71,789 acres was reached in 1878. Though reduced to 65,000 acres in 1881, the area again rose to over 71,000 acres in 1885, after which a further fall set in. There were some 59,000 acres under hops in 1895, but in

* H.C.—302, 1890. See also, more especially as regards the estimated area and productions prior to the official *Agricultural Returns*, the *Report of the Beer Materials Committee*. [C.—9172.] Appendix IV.

† The records of the area prior to the abolition of the hop duty in 1862 indicate that the area in the previous fifteen years varied between 42,000 and 58,000 acres. (*Report of the Beer Materials Committee*, App. IV.)

the next two years 8,000 acres were lost, and in 1898 the total stood at 49,735 acres, this latter being the only year since 1867 in which less than 50,000 acres have been scheduled.

The cultivation of hops, as is well known, is now confined to a few counties in England, Kent growing three-fifths of the entire crop. Herefordshire, Sussex, Worcestershire, Hampshire, and Surrey also show an appreciable extent of land devoted to this culture, while Salop, Gloucester, and Suffolk were the only other counties with any hops in the present year. Formerly, however, a very few acres have at one time or another been under hops in almost all the counties of England; Rutland and Westmorland being the only two which have never figured in this category of the Agricultural Returns, while an acre or two in Wales and Scotland were recorded in most years prior to 1874. Kent has, however, always formed the great centre of this industry, and the five counties next named above have, as far as the records show, also always been far in advance of any others.

Hops are one of the most uncertain of the crops grown in this country, and in addition to the expense of cultivation and liability to insect pests, they are subject to very large variations in yield from year to year. Official statistics of production, since the repeal of the hop duty in 1862, date back only to 1885; but from this latter date the yields recorded have fluctuated between 4.81 cwts. per acre in 1888, and no less than 12.76 cwts. per acre, or not far from three times as much, in the present year. The total produce in the same period has varied between 281,291 cwts. in 1888 and 776,144 cwts. in 1886. Were comparable statistics for earlier years available the range would no doubt be far greater. For instance, it has been estimated* that the production in 1882 was only 98,900 cwts., which, upon the recorded area of 65,619 acres, represents a yield of but $1\frac{1}{2}$ cwts. per acre. A still smaller quantity, viz., 88,000 cwts., was charged with duty in 1854, the area in that year being given as 54,000 acres. It is a

*Beer Materials Committee, App. IV.

little curious to note that in the very next year, 1855, the amount charged with duty was almost as large as the quantity harvested in 1886, attaining a total of 743,000 cwts., which would probably represent the biggest production of the past fifty years, with the possible exception of 1886.*

Prior to 1861-6 the importations of hops appear to have been very small; only in a single instance (1854) did they attain 100,000 cwts., and in 1851 there was an excess of exports. In the early sixties, when the hop duty was abolished, there was a sudden increase in the imports, to a level which, as already mentioned, has remained practically constant ever since. The maximum gross importation was 322,500 cwts. in 1869, and 319,600 cwts. in 1882, while the minimum since 1866 has been 122,700 cwts. in 1873. In 1886, however, an unusually large exportation (69,000 cwts. of British and foreign hops) reduced the net imports of that year to 84,000 cwts., which was just the same as in 1873. During the decade which has elapsed since the Committee of the Hop Industry made its report, the total imports have shown very little fluctuation, with the exception, perhaps, of 1897 and 1898, which were respectively the lowest and highest of the ten years.

A certain quantity, usually about 10,000 cwts., of English hops are annually exported, mainly to the East Indies, the Cape, Australia, Belgium, and sometimes Germany. The re-exports of foreign hops have varied of late years between 3,000 and 8,000 cwts; they are chiefly shipped to Germany and the United States, but both appear to be uncertain markets.

An attempt may now be made to estimate the quantity of hops available for consumption in the United Kingdom by the rough-and-ready method of adding the net imports of one year to the production of the preceding harvest. The table on the next page shows the result of such a calculation for the past decade.

Upon this assumption it would seem that the total available, on the average of the ten years 1888-97, was about

*Particulars of the production in 1898 and 1899 will be found on page 428.

622,000 cwts. The earlier portion of this table, however, comprises two years (1888 and 1890) in which the home production was exceptionally low, and it would perhaps on that account be nearer the fact to assume that the amount annually available for consumption in this country is represented by the average of the last five years, viz., about 680,000 cwts.

Consumption of Hops in the United Kingdom.

Year.	Area.	Production.	Net Imports of following Year.	Consumption.	Proportion of Foreign to Total Supply.
	Acres.	Cwts.	Cwts.	Cwts.	Per Cent.
1888 - -	58,490	281,291	181,343	462,634	39'2
1889 - -	57,724	497,811	175,534	673,345	26'1
1890 - -	53,961	283,629	185,526	469,155	39'5
1891 - -	56,142	436,716	176,834	613,550	28'8
1892 - -	56,259	413,259	185,716	598,975	31'0
1893 - -	57,564	414,929	168,316	583,245	28'9
1894 - -	59,535	636,846	204,087	840,933	24'3
1895 - -	58,940	553,396	193,738	747,134	25'9
1896 - -	54,217	453,188	148,660	601,848	24'7
1897 - -	50,863	411,086	223,747	634,833	35'2
Average	56,370	438,215	184,350	622,565	29'6

It would, nevertheless, appear probable that the quantity has increased during the latter part of the decade, inasmuch as the average of the earlier five years works out to only about 560,000 cwts.* It is not possible to give an estimate of the quantity which may be considered available for consumption in the year now closing, since it has often happened that the imports during December have been considerably in excess of the amounts received in other months; in 1898, for instance, some two-fifths of the whole year's importation arrived in November and December. It may be stated, however, that the imports during the ten months ending October, 1899, were slightly below the receipts during the corresponding period of 1898, and that last year's production in England was some 55,000 cwt. below that of 1897.

A rough estimate of the fluctuations in the price of hops from year to year may be obtained from a consideration of the average values at which the hops imported and exported were stated in the Trade Returns. It will be noticed that

* The evidence before the Committee on the Hop Industry as to the stocks on hand at the end of the eighties is somewhat conflicting.

the native hops exported are valued at a much higher rate than the foreign imported.

YEAR.	AVERAGE VALUE PER CWT.		YEAR.	AVERAGE VALUE PER CWT.	
	Imports.	Exports. (British Produce.)		Imports.	Exports. (British Produce.)
	£ s.	£ s.		£ s.	£ s.
1889	3 12	4 19	1894	3 19	4 18
1890	4 13	8 1	1895	2 19	3 13
1891	5 0	7 19	1896	2 17	3 6
1892	5 2	7 5	1897	3 4	4 1
1893	5 12	6 18	1898	4 4	5 10

Considering more particularly the sources of our supply of hops during the past ten years, the changes in the quantities received from different countries are best exhibited in the accompanying table:—

Imports of Hops, 1889-98.

Year.	United States	Germany.	Belgium.	Holland.	France.	All other Countries.
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.
1889	77,529	20,402	38,858	47,463	14,401	641
1890	73,448	25,129	40,498	30,527	10,383	2,043
1891	80,226	17,199	42,637	35,355	15,893	3,956
1892	80,829	11,691	39,044	38,384	12,206	5,353
1893	141,819	3,785	37,351	15,214	2,481	3,742
1894	109,731	12,053	33,622	26,164	5,980	1,605
1895	153,046	15,400	25,411	19,564	2,866	874
1896	135,822	13,011	32,984	19,912	3,996	1,316
1897	84,905	15,881	36,787	20,667	5,159	755
1898	191,535	8,280	30,151	9,169	1,644	3,357

Our imports are thus chiefly derived from the United States. Moreover, the predominance of that country as an exporter of hops to the United Kingdom has been steadily accentuated to such an extent that, whereas in 1889 the receipts from the States formed 39 per cent. of our total imports, they in 1898 amounted to 78 per cent. This increase has been at the expense chiefly of Germany, Holland, and France; the shipments from all these three countries to the United Kingdom having largely diminished of late years. Belgium, which has always during the decade ranked next to the United States, has suffered somewhat less, but the total received thence has nevertheless fallen off by 25-30 per cent. The consignments received from Holland and Belgium are really, in the main, of German origin. No other foreign

country contributes any material quantity of hops to our supply, but mention may be made of 3,000 cwts. received from Russia in 1898. Among our colonies, Canada regularly sends a few hundred cwts., and Australasia usually sends still smaller consignments, although the quota from that division of the world reached 2,000 cwts. in 1891.

The hop requirements of the world are supplied mainly by three countries—England, Germany, and the United States; and each of these would appear to produce between 400,000 and 500,000 cwts. annually, the out-turn of the United States being the smallest of the three.

The area under hops in Germany amounts to as nearly as possible 100,000 acres, and it is noteworthy that this has exhibited a very steady, although slow, decline during the last ten years, the area in 1888 having been 114,700 acres, and 97,600 acres in 1897. The production per acre is very much below the English, averaging only 4.67 cwts., as compared with the British 7.77 cwts. in the same period. In spite, therefore, of an acreage not very far from double the British, the total production in Germany is only approximately the same, or a very little more than our own, amounting to 497,000 cwts. annually on the ten years average. This compares with 438,000 cwts. in England; but a comparison of the last five years of the decade shows the English production to have averaged 494,000 cwts., and the German 485,000 cwts. This change would appear to be mainly attributable to the seasons, a very poor yield having been experienced in England in 1888 and 1890, and in Germany in 1893.

Fully half the acreage devoted to hops in Germany is in Bavaria, the most important district being Middle Franconia, which grows about a quarter of all the hops produced in the Empire. Würtemberg, Baden, and Alsace have also considerable areas under hops, while in Prussia the chief district is Posen, towards the east.

Although Germany thus produces about the same quantity of hops as the United Kingdom, and in spite of its producing a slightly larger quantity of beer than this country*, it is

* The average annual production of beer in the United Kingdom during the five years 1893-97 was 1,200,688,000 gallons, and in Germany 1,267,587,000 gallons [*Return of Alcoholic Beverages*, H. C. 72, 1899].

nevertheless the fact that it exports a considerable surplus of hops every year, while, as has been seen above, the production of the United Kingdom is insufficient to meet the demand. There are indeed some 50,000 cwts annually imported into Germany, almost entirely from Austria; but the exports amount to three times this amount, and have varied in 1894-98, between 215,000 and 146,000 cwts., shewing some decline during the period. This leaves an average net export of 143,000 cwts. Most of the exports go to England (via Belgium and Holland or direct) and to France. Assuming, as has been done above for the United Kingdom, that the hops of one year are consumed in the next, these figures would indicate an average available for consumption of about 340,000 cwts in the quinquennium 1894-98.

After Germany, the principal hop-producing country in Europe is Austria, with about 40,000 acres, three quarters of which are in Bohemia. Unlike Germany, this area has shown some tendency to increase during the past decade, the acreage being given in 1888 as 35,700 acres, and in 1897 as 42,400 acres. The average production over these ten years is even lower than in Germany, viz., 3.6 cwts. per acre, the total production thus averaging 137,000 cwts. But little attention is paid to this culture in Hungary, the last-issued statistics for that kingdom showing a production of 5,900 cwts. from an area of 900 acres in 1897. The Austro-Hungarian trade returns but rarely show any imports of hops, but the exports of the dual monarchy attain a total of 50,000 cwts. (average of 1894-8). This quantity, practically the whole of which goes to Germany, has exhibited remarkable steadiness during the past five years. Deducting these exports from the production of 1893-97, there remain available for consumption some 110,000 cwts.

Of other European countries the most important consumers of hops are France and Belgium. The first-named annually devotes about 7,000 acres to this crop. The total production during the years 1888-97 averaged nearly 67,000 cwts., this being equivalent to the high mean yield of 9.4 cwts. per acre. France is unable to meet her own requirements of hops, and the net imports average 40,000 cwts., chiefly from Belgium and Germany.

For Belgium, statistics of area and production only appear at somewhat rare intervals. The Agricultural Census of 1895 shows the area in that year to have been 9,150 acres, and the production nearly 96,000 cwts., *i.e.*, $10\frac{1}{2}$ cwts. per acre. In 1880, when the previous agricultural inquiry was made, the area covered 10,337 acres. The imports amount to about 41,000 cwts., and the exports to 28,000, on the average, leaving a net importation of about 13,000 cwts.

Statistics of the hop production in the United States are meagre, and only the recent official information on the subject has been published in this Journal.* It appears that the area under hops was, at the time of the last census, about 50,000 acres, there having been 50,212 acres in 1889, and 48,962 in 1890. Definite particulars for later years are not available; but according to commercial estimates, which the United States Agricultural Department appears to consider reliable, there has been a rapid extension in the three Western States of California, Washington, and Oregon, and the area there in 1895 was estimated roughly at 30,700 acres, as against 12,200 acres in 1889.

The figures of production are equally uncertain, except for the census years of 1889 and 1890, when the totals were 349,743 and 329,220 cwts. respectively. Commercial estimates would appear to indicate that the production, on the average of 1893-97, did not exceed 420,000 cwts.

The United States produce more hops than they can utilise, and their trade returns show a net exportation, which has been fairly constant, of 121,800 cwts. during the five years ending June, 1898. This amount, subtracted from the estimated production of 1893-97, would leave not more than 300,000 cwts., in round numbers, available for consumption. But, as in the case of Belgium, the data for such an estimate are scanty, and the probable error must be much larger than in the case of those European countries which have definite statistics extending over a series of years.

* Vol. IV., March, 1898, p. 495; and Vol. VI., September, 1899, p. 234.

THE PEAR AND CHERRY SAWFLY (*Eriocampa
limacina*—Cameron).



Slugworms upon a leaf.

The extremely repulsive larva of this sawfly, termed by Cameron *Eriocampa limacina*, and by other entomologists *Selandria atra*, is frequently most destructive to pear and cherry trees. It also infests apple, plum, damson and peach trees, and is occasionally seen upon oak, birch, and other forest trees, as well as on some species of thorns. In the past dry season, cases have occurred where nearly all the leaves fell from pear trees in consequence of the continuous attacks of larvæ of this sawfly, which are sometimes called slugworms.

Heat and drought are, without doubt, favourable to the multiplication and destructive activity of this insect, while cool, showery weather interferes not only with the hatching of the eggs, which are laid upon the upper surface of the

leaves, but also with the growth and health of the larvæ. It is generally found that the larvæ or caterpillars do not cause serious harm in wet seasons.

Life History.

The sawfly itself is harmless. It is not quite a quarter of an inch in length, having a wing expanse of rather more than half an inch. Its body is blackish, with a yellowish tinge through the middle part; its wings are hyaline or glassy, with dark lines or bands running through them. The fly usually makes its appearance early in June, and in the first or second week of this month the female makes a curved abrasion in the upper surface of the leaf, with the aid of her peculiar saw-like apparatus which resembles that of the gooseberry sawfly (*Nematus ribesii*), and many other sawflies. In this abrasion an egg is deposited; this can be easily seen on the leaf, as a slight, round excrescence is formed, in the centre of which there is a transparent skin or film covering the whitish egg. The number of eggs upon one leaf often amounts to twenty or even more, but as a rule not more than five or six larvæ are seen upon one leaf.

The larva, which is hatched in about twelve days, is at first white; in a day or two it becomes green, and soon afterwards an olive-green slime exudes from and covers its body. This exudation is evidently designed to protect the insect from the influences of weather, to which it is fully exposed upon the upper surface of the leaf. The larva is particularly ugly at this period of its life, being dark green and slimy, while its head and the upper part of its body are much broader than the lower part, which tapers towards the end. At this stage it very much resembles a malformed slug or a tadpole. It has seven pairs of "sucker" feet on its abdomen, three pairs of distinct feet upon the thorax, and a pair of very rudimentary "sucker" feet at the end of its body. But with all these feet it moves very slowly, being slug-like in its movements. When it is full grown it is close upon half an inch in length, and at about the end of a month, after several moults or

castings of skin. it loses its slug or tadpole form and assumes the shape of an ordinary larvæ, of an orange yellow or buff colour. After this change it crawls down the tree, or falls, to the ground, and develops into a dark-coloured chrysalis in a little cell made of earth, in which it remains until the next spring, when it changes to a sawfly.

The larvæ of this sawfly are found upon the leaves of fruit trees even as late as October. Some specimens were sent to the Board of Agriculture on the 2nd October last. It is evident, therefore, that there are two broods in a summer, at least when the conditions are favourable. Unlike most other larvæ and caterpillars, this slugworm eats away the leaves from their centres and not from the outsides ; it clears away the parenchyma, or soft tissue, between the ribs and nerves, leaving them bare as the framework of a parasol. Mr. Cameron, in his *Monograph of British Phytophagous Hymenoptera*, says that the slugworms eat only the epidermis. At first the leaf gets eaten in patches, but ultimately every particle of green is devoured, and the leaf finally falls to the ground. When these larvæ are present in great numbers the noise they make in feeding, Mr. Cameron adds, is said to resemble the falling of drops of rain on the leaves. They are very sluggish, and their sluggishness is only surpassed by their voracity. A severe infestation of them entirely prevents the production of fruit, and even a slight attack has a marked effect on the crop of pears, which cannot come to perfection if the leafage of the tree is injured.

This insect, or a species of sawfly closely resembling it, is said to do much harm to pear and cherry trees in America. It is there styled *Selandria cerasi*. As early as 1797, according to Harris, the larvæ of this sawfly caused great injury. "Small trees," he says, "were covered with them, and their foliage entirely destroyed, and even the air, by passing through the trees, became charged with a disagreeable and sickening odour given out by these slimy creatures." In California it is often very troublesome, especially to pear trees. Professor Saunders states that in 1874 this sawfly was unusually abundant in Ontario, in many cases destroying the foliage so

thoroughly that the trees looked as if they had been scorched by fire. It is also well known in France and Germany.

Methods of Prevention and Remedies.

As it is clear that the chrysalides of this sawfly are in the earth immediately under the fruit trees upon which the larvæ have been feeding, it is desirable to dig the ground all round the trees in the early spring, and to hoe it with pronged hoes so that the earth may be broken up finely. Quicklime should then be put on and hoed in. In gardens, after the digging and hoeing, it would be useful to beat down the earth in the spring with a shovel in order to prevent the flies from coming up. Kainit would be destructive to the larvæ, as it is to those of the Pear midge. It should be put under the trees in the autumn in moderate quantity and evenly distributed.

With regard to remedial measures, the larvæ in the slimy stage might be killed, or made to fall off the leaves, by dusting them with lime. The lime must be quick and very finely powdered, and can be distributed over the trees by means of flour-scoops fastened to poles. The lime on the leaves would also make them unpleasant for the larvæ in their early stages, and probably prevent the hatching of eggs.

Spraying with paraffin emulsion would also be efficacious if carefully done. This emulsion is made by dissolving half a pound of soft soap in a gallon of boiling water, adding two gallons of paraffin oil while the soap water is boiling, and churning the mixture well together until the ingredients are thoroughly incorporated and a creamy substance produced. This should be diluted with 10 gallons of water and distributed all over the infested leaves by means of a garden engine. For large trees there are engines specially made, with strong pumps, to force the emulsion all over the trees. A solution of soft soap and quassia is also efficacious, as it makes the leaves bitter and unpleasant. This is made by adding the extract of 6 or 7 lbs. of quassia chips to 7 lbs. of soft soap, dissolved in hot water, and diluted with 100 gallons of water. The mixture should be well stirred, and distributed by means of the engines described above. Paris green is the best remedy for these slugworms, as it poisons their food, but in

this country there is an objection against using it on account of its poisonous qualities. It is used extensively in the United States for attacks of the sawfly larva and many other insects. It should be applied in the proportion of 1 lb. of Paris Green to 180 gallons of water, carefully mixed and distributed all over the leaves as evenly as possible. Paris Green can be obtained in the form of paste, when it can be much more easily mixed with water than the powder, which is so fine that the least breath of air blows it over the face and clothes of those who are using it.

These remedies would be applicable to pear, apple, plum, and damson trees. It would be more difficult to apply them to large cherry trees, as their foliage is so thick, and the fruit is often nearly ripe when the attack of the insect is first noted. After the cherries are picked the trees should be dressed to prevent the larvæ from devouring the foliage and weakening the trees for the next season.

SHEEP-SCAB.*

Sheep-Scab in this country is a purely contagious disease, affecting the woolly parts of the body, and due to the presence on the skin of a species of mite or acarus called *Dermatodectis ovis*, but sometimes *Posoroptis communis*.

Parasites very similar in form and size are also found on the horse, dog, and other animals, producing the disease commonly called mange, but the mange acarus of the horse, dog, or other animals does not produce Sheep-Scab. It may therefore be accepted that where sheep become affected with Sheep-Scab they must have previously been in contact with diseased sheep, or with tufts of wool left by diseased animals on fences, posts, hurdles, or other objects against which the animals have rubbed.

Although the usual symptoms of Sheep-Scab are known to most flock masters and shepherds, a description of them may be given here.

One of the first symptoms apparent in a sheep that has contracted scab is restlessness on the part of the animal, and a desire to bite the infected part or to rub against posts, fences, hurdles, or other members of the flock. This restlessness is the result of the irritation and itching produced by the mites pricking the skin of the sheep in their endeavour to obtain food, and as they increase in number the constant biting and rubbing of the sheep to allay the irritation causes

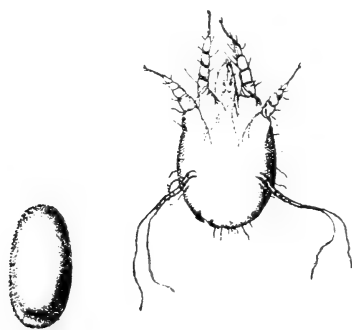
*Copies of this article may be obtained separately (Leaflet No. 61), free of charge, upon application to the Secretary, Board of Agriculture, 4, Whitehall Place, S.W.

injury to the skin, which is followed by an exudation of serum and the formation of crusts or scabs, under the edge of which the parasites and their ova are to be found.

As the acari or mites increase in number they move from beneath the scabs to the more healthy parts of the skin, and thus extend the area of the disease.

The injury to the skin produced by these mites is followed by falling of the wool, and the fleece becomes broken and tufted, or matted together, giving the animal a ragged appearance.

As soon as a sheep is found to present the above symptoms the owner should at once examine the animal, and, if he has any doubt as to the nature of the disease, call in the assistance of his veterinary adviser to discover whether the itching and rubbing are due to the presence of the Sheep-Scab or another parasite, or other causes.



(Magnified 250 diameters.)

FIGURE 1.—SHEEP-SCAB ACARUS.

The most convenient method of examining a piece of wool or crust taken from a suspected case of scab is to spread it out upon a dark surface and place it in the sun or any other warm position, when the acari will be seen as small white specks moving about on the wool or perhaps on the surface beneath it. These moving objects should then be examined with a pocket lens or with a microscope having an objective of low power (one inch will be sufficient), when the parasite and the ovum will present the appearances seen in Figure 1.

The parasites and the ova are usually abundant in the

crusts or scabs on the surface of the skin, and if a small portion of the crust, after being softened in a mixture composed of glycerine and a solution of potash or soda, is teased out and placed upon a slide, there will be found, in confirmed cases of scab, whole acari, portions of the detached legs, and ova mixed up with the fibres of the wool and fatty matter.

It has been stated that the parasites of Sheep-Scab may be easily identified by the naked eye, and there are some whose experience enables them to easily do so ; but now that the decisions of the Veterinary Inspectors of Local Authorities in Great Britain are followed by serious consequences to the owners if their sheep are certified to be affected with scab, it is most important that no errors should be made in diagnosis. It therefore becomes necessary that all enquiries into reported outbreaks should be conducted on the above lines, because, unless the particular acarus or some of the ova can be discovered, the disease cannot properly be declared to be present.

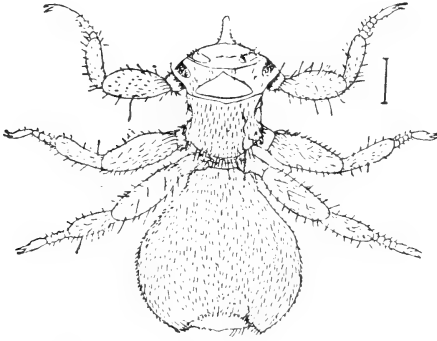
Since the life history of the Sheep-Scab parasite has a very important practical bearing upon that part of the Sheep-Scab Order of 1898 which deals with the dipping of sheep, it should be explained that the mature female after having laid from 15 to 24 eggs dies, and the eggs are hatched in about seven days, the young parasites becoming sexually mature in about eight days, and another generation of eggs being laid 14 or 15 days after the first. Effective dipping with a suitable dip kills the acari, but may not destroy the vitality of the ova

It will thus be seen that not only do the acari rapidly multiply, but that it is necessary, if the disease is to be completely eradicated from the flock, that the sheep should be dipped a second time not later than the 14th day ; for whilst the first dipping might have killed all the acari, their ova may not have been destroyed, and hence a second dipping becomes necessary to kill the produce of these ova.

There is another parasite which is frequently to be found in the wool of sheep, viz., the common tick, or *Melophagus ovinus*, represented in Figure 2.

It will be observed that this creature differs very materially

in size and form from the Sheep-Scab parasite, but as it often produces irritation of the skin, accompanied by constant rubbing, which is also a usual symptom in Sheep-Scab, it has



(Magnified: the line shows natural size)

FIGURE 2.—COMMON TICK.

been considered desirable to produce the above sketch, in order to guard against errors in diagnosis. Where these ticks are numerous and causing much irritation of the skin, it may be desirable to dip the sheep once with the same solution as for scab.

IMPROVEMENT OF LAND ACT, 1899.*

The Board of Agriculture desire to call attention to the provisions of the Improvement of Land Act, 1899 (62 and 63 Vict., c. 46), which comes into operation on 1st of January, 1900. This Act has been passed with a view to give increased facilities to owners of land desirous of carrying out agricultural and other improvements with the aid of borrowed money. With this object the new Statute amends the Improvement of Land Act, 1864, and other Acts, authorising the creation of rentcharges for the improvement of land.

Under the new Act the maximum period over which rentcharges authorised after the commencement of the Act may be allowed to extend is 40 years. It must not, however, be assumed that the full term will always be applicable. The period to be allowed in each case will be determined by the Board, regard being had to the character and probable duration of the improvement.

By another provision the land charged with the payment of the rentcharge may be land other than that which is directly improved; provided (*a*) that such other land is shown to the satisfaction of the Board, by statutory declaration, to be held for the same estates or interests, and to be either subject to the same incumbrances (if any) or to be free from incumbrances; and (*b*) that in the opinion of the Board such other land may properly be included in the charge.

Improvement Companies are empowered (by resolution passed by three-fourths of their shareholders present at an extraordinary meeting) to adopt, as improvements authorised by their own special Acts, all or any of the improvements

* Copies of this article may be obtained separately (Leaflet No. 59) free of charge, on application to the Secretary, Board of Agriculture, 4, Whitehall Place, S.W.

authorised by the Improvement of Land Act, 1864, or by any enactment amending it.

The Board of Agriculture are empowered to extend the period of repayment of improvement charges created (whether before or after the passing of the Act) in respect of the planting of woods or trees, on application made by the landowner, not sooner than seven and not later than ten years from the date of the Order creating the charge, but subject to the consent of the persons entitled to the charge.

The new Act extends to Scotland certain additional improvements already authorised as regards England and Wales and Ireland by the Limited Owners Residences Acts, 1870 and 1871; The Limited Owners Reservoirs and Water Supply Further Facilities Act, 1877; Sections 30 and 25 of the Settled Land Act, 1882; Section 13 of the Settled Land Act, 1890; and Section 74, sub-s. (1) (b) of the Housing of the Working Classes Act, 1890.

ARGENTINE AGRICULTURAL CENSUS OF 1895.

The recently-published reports on the results of the Argentine Census of 1895 furnish some interesting information relating to the progress of agriculture in the Republic. It appears that the area of cultivated land as ascertained in 1895 amounted to 11,579,000 acres, as against 5,985,000 acres returned at the census of 1888; from these figures it results that the extent of land under cultivation had nearly doubled in the interval between the two inquiries. This great extension was mainly accounted for by the increase in the surface sown with cereals, and particularly with wheat. The distribution of the cultivated land at the two periods was as follows :—

	1888.* Acres.	1895. Acres.
Cereals - - - - -	4,364,000	9,227,000
Industrial plants - - - - -	140,000	308,000
Potatoes, pulse, and vegetables - - - - -	101,000	222,000
Lucerne and other forage crops - - - - -	969,000	1,821,000

* The figures shown under the various crops for this year do not account for the whole of the 5,985,000 acres returned as cultivated area.

Wheat is the most important of the corn crops produced in Argentina, and the rapid growth of the area devoted to its cultivation is one of the remarkable features brought out by the Census. In 1895 the surface sown with this cereal was 5,062,717 acres; whereas in 1888 it was returned at 2,014,132 acres; and in 1871 at 1,432,600 acres.

Maize occupied 3,073,130 acres in 1895, or 1,093,207 acres more than in 1888, when the total area under this grain was 1,979,922 acres. Linseed, which is treated in the more recent census returns as a cereal, was grown on 956,690 acres, as

compared with 299,124 acres at the earlier inquiry, and barley on 134,798 acres, as against 78,820 acres in 1881.

Industrial plants were grown on 308,456 acres in 1895; they included 82,644 acres under vines, 33,283 acres under arachides, 151,344 acres under sugar cane, 39,014 acres under tobacco, and 2,171 acres under cotton. Of the 222,154 acres credited at the last census to root, vegetable, and pulse crops, potatoes accounted for 52,077 acres, haricots for 51,378 acres, lentils, beans, peas, etc., for 60,508 acres, and other vegetables for 58,191 acres.

Lucerne is the principal cultivated forage crop, the surface devoted to its growth in 1895 was estimated to amount to 1,761,335 acres, while other forage crops were grown on only 59,532 acres.

The land returned under woods, orchards, and market gardens extended in 1895 to 504,436 acres, as compared with 89,229 acres similarly occupied in 1888.

With respect to live stock it is stated that owners are believed to have generally understated the dimensions of their flocks and herds for fear of affording information which might serve as a pretext for increasing the taxation to which they are subjected. The Reporter of the Census Commission thinks, therefore, that it would be necessary to increase the figures by about 20 per cent. in order to approximate to the truth. A comparison, however, of the results of the Census of 1888 with that of 1895, which was held under the same conditions, is held to give an indication of the progress of the live stock industry.

The following table shows the number of cattle of various kinds in the Republic in 1888 and 1895.

	1888.	1895.
Native Cattle - - - -	17,574,572	14,197,159
Crossbred Cattle - - - -	3,388,801	4,678,348
Pure-bred Cattle - - - -	37,858	72,216
Dairy Cows - - - -	960,426	1,800,799
Draught Oxen - - - -		953,004
Total - - - -	21,961,657	21,701,526

According to these figures, it would appear that between 1888 and 1895 there was a diminution of 260,131 head in the

cattle-herds of the Republic. This decrease, even if it be accurate, must, it is stated, not be regarded as an indication of a decline in the cattle-rearing industry, because the diminution is solely confined to the native cattle. The number of pure-bred animals has increased by 34,358 head, of cross-bred by 1,289,547, and of dairy cows and oxen by 1,793,377 head. Moreover, the improvement in the quality of the animals as the result of cross-breeding compensates largely for the decline in numbers.

The principal breeds of cross-bred and pure-bred cattle enumerated in 1895 were as follows :

	CROSS-BRED.	PURE-BRED.	
	No.	Bulls No.	Cows No.
Durham - - - -	2,361,694	22,748	41,402
Hereford - - - -	304,395	2,838	7,320
Polled Angus - - - -	18,421	390	511

Relatively to the population there are 542 head of cattle to each 100 inhabitants.

With regard to sheep, there was an increase of 7,673,465 head in the 7 years between 1888 and 1895, as will be seen from the following figures :

	1888.	1895.
Native Sheep - - - -	24,322,214	17,938,061
Cross-bred Sheep - - - -	42,002,871	56,106,187
Pure „ „ - - - -	381,012	335,314
Total	66,706,097	74,379,562

After Australia, which possesses 99 millions of sheep, Argentina has the largest flocks, relatively to the population they represent 1,859 sheep per 100 inhabitants.

The other descriptions of animals enumerated in the returns are as follows :

	1888.	1895.
Horses - - - - -	4,234,932	4,446,859
Asses and Mules - - - - -	417,494	483,369
Goats - - - - -	1,894,386	2,748,860
Pigs - - - - -	393,758	652,766
Ostriches - - - - -	176,125	82,497
Poultry - - - - -	5,299,877	9,111,322

The total value of all the live stock in the Argentine Republic was estimated in 1895 at £76,000,000, of which the cattle represented about £45,000,000 and the sheep £24,000,000.

AGRICULTURAL AND MISCELLANEOUS NOTES.

EXPERIMENTS IN THE DESTRUCTION OF CHARLOCK.

The Board have received a copy of a report on the experiments in the spraying of charlock and runch, which have been carried out during the present year by Professor J. R. Campbell, on behalf of the Yorkshire College and the Joint Agricultural Council of the East and West Ridings, in continuation of his experiments in Scotland in 1898.

The spraying materials employed consisted of sulphate of iron and sulphate of copper, the strength of the solutions of the former varying between 6 and 16 per cent., and of the latter from 2 to $3\frac{1}{2}$ per cent. They were applied in both cases at the rate of 35 to 40 gallons per acre. The cost of the sulphate of iron used in these experiments was 6s. per cwt., and that of the sulphate of copper 40s. per cwt., but inquiries showed that sulphate of iron, sufficiently pure, could be had at 4s. per cwt., and even for 3s. if purchased in quantity, while sulphate of copper was quoted at a little over 30s. per cwt., consequently the cost of spraying per acre with a 10 per cent. and a 15 per cent. solution of sulphate of iron need not be greater than 1s. 5d. and 2s. 2d. per acre respectively. In the same way the cost of the sulphate of copper solutions at a strength of 2 per cent. and 3 per cent. would amount to about 2s. 3d. and 3s. 3d. respectively per acre.

The tests were carried out on 25 farms in Yorkshire during the months of May and June, and at a very early stage in the tests it was quite apparent that the influence of the weather was a most important factor in determining the success or failure of the operation. The first trial was at Emley, and

was made on a bright, dry, and calm day. At this centre the operation was a decided success. The second test was at Stainton, on a showery day, and of all the centres this was one of the least successful. At Wressle, where the third trial was made, the weather was not only wet, but very windy, and it was found that the spray was blown by the wind against the rows of corn, which acted as a shelter to the charlock growing between them, and this, combined with the wet weather, brought about a result scarcely more successful than that at Stainton. In the subsequent sprayings, which were discontinued until the weather had improved, the experience was uniform, viz., that charlock or runch sprayed with a proper amount of material, before, during, or immediately after wet weather, to a large extent escaped destruction, the same being the case when the weather was windy.

With regard to the question of the age of the charlock, a number of tests had been arranged, but the weather was unfortunately unfavourable. One was made at the proper time, and, in this case, the charlock plants were just getting into rough leaf and the rows of barley were about 3 inches high. The result was that where the solutions were put on in proper quantity the effect on the charlock was to reduce the leaves to a black cinder, from which few recovered. The results of spraying fully-grown charlock varied according to the strength of the solution; in all cases when the weather was suitable the leaves were killed, but the flowers and stems were only partially destroyed. If the charlock is sprayed after the stems and flowers are formed, though the leaves are destroyed, the stems and flowers retain sufficient vitality to form seeds, the number of which is, however, much less than in the case of a plant in its normal condition. Spraying strong well-grown charlock produces a stunted growth, and enables the corn, if good, to gain the mastery of it.

On account of the probable danger of destroying the corn and the young seeds, rather weak solutions were at first applied. Later, however, these were strengthened in the case of sulphate of iron to 12, 14 and 16 per cent., and it was quite apparent on the one hand that solutions of greater

strength would not injure the corn, and on the other hand that weaker solutions would not effect the desired destruction of charlock and runch. It must be remembered, however, that these solutions were used on strong grown charlock.

At no centre did the spraying have any injurious result on the crops sprayed, which were oats, barley, and spring wheat ; nor was there any difference observed in times of ripening. In a few cases it was reported that after spraying the corn became green, but this, it appears, applies to the portion dressed with sulphate of iron rather than to those dressed with sulphate of copper.

In a few cases the crops were sprayed twice on the same day, a plan which was found to answer well, and a double application appears to be an advantage even if the solutions used be somewhat weaker. When inspecting the experiments it was noticed at many of the centres that a second batch of plants had grown since the spray had been applied. A second application after an interval of about ten days would also have destroyed this second crop.

In order to test the effect of the solution on other plants, a number of pots were sown with various cereals, roots, grasses, and vegetables at the experimental farm at Garforth, and the seedlings sprayed with a 12 per cent. solution of sulphate of iron. The only plants seriously affected were beans, mustard, turnips, and swedes. Of the last three, which all belong to the same order as charlock and runch, the mustard suffered much more than turnips, while the swedes suffered least. The destruction of the beans was due to the large quantity of solution applied.

In concluding his report on these experiments, Professor Campbell observes that nothing certain is known with regard to the specific action of sulphate of iron and sulphate of copper solutions on charlock plants. It cannot, he thinks, be due to the roughness of the charlock leaves retaining the spray, for there are many other plants which retain the spray equally well and yet escape injury. In all probability the result is due to the fact that cruciferous plants contain certain substances peculiar to their order, substances which may react chemically with iron or copper salts.

In summing up the experience gained in spraying 144 acres of charlock and runch-infested grain crops in Yorkshire, Professor Campbell draws the following conclusions :

1. The operation is only completely successful when the plants are taken in the youngest stage.
 2. A bright, dry, and calm day is a necessary factor to success.
 3. In the case of sulphate of iron at least a 10 per cent. solution is required, and this should be applied at the rate of not less than 40 gallons per acre. Even a 15 per cent. solution of sulphate of iron may be necessary if the plants have got beyond the first rough leaf stage.
 4. Such solutions will not injure either corn or young seeds.
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HARVEST WAGES IN 1899.

The *Labour Gazette* for October, 1899, has analysed the returns received by the Board of Trade from 149 farmers in the Midland, Eastern, Home, and Southern and South Western Counties, giving the cash earnings, exclusive of perquisites, of 2,273 men employed at harvest by them.

Generally speaking, the returns show that the rates of harvest wages were about the same as last year in the majority of cases, though there was an upward tendency in some counties. Looking at the general results, the harvest was a good one both for the employers and the men who were employed. The employers, owing to the crops not being beaten down, were able to use self-binding machines and thus save labour, and also, owing to the fine weather, were able to get the harvest in very rapidly, while the men who were paid a lump sum for the harvest, and those engaged at piecework, were also able to get through the work quickly and without interruption. Consequently they earned their harvest money in a short time, and were free to go on with other work at the current rate of weekly

wages. An employer writes from Gloucestershire that "a lot of the corn was fit to carry straight from the binders without stooking."

In the majority of cases in the districts for which returns have been received, the harvest was over before the beginning of September, and in some of the South Western counties in the first half of August.

In the great corn-growing counties of Cambridgeshire, Essex, Norfolk, Suffolk, and Lincolnshire the average cash earnings per man for the entire harvest are estimated, on the basis of the returns received, at £7 11s., and in the Midland, Home, Southern and South Western counties grouped together at £4 12s.

In addition to cash payments, beer or cider is given in a number of cases, and sometimes light refreshments, such as tea, bread, butter, and cheese. Overtime is also sometimes paid for. In Norfolk and Suffolk 1s. is often given for hiring money, and also "horkey" money, *i.e.*, about 2s. 6d., for a supper at harvest.

Taking the case of Norfolk and Suffolk, where the usual custom is to pay a lump sum for the harvest, the rates generally varied from £6 10s. to £7. In some cases rather lower, in others rather higher rates were paid. Sometimes a certain number of acres is allotted to each man, and sometimes not. If the weather is not favourable for harvest work employers often employ their men at other work at the ordinary rate of weekly wages. A large employer of labour in Suffolk states that he paid £7 to about 100 men on the farms he manages, this being the same amount as he paid last year. Each man was paid £7 for 13 acres, and in addition was given 3 bushels of malt and 3 lbs. of hops. Ten shillings an acre was given for cutting and carting every acre over the 13 stipulated acres. Frequently the harvest was completed in 16 to 20 working days, and in some cases in less. In most cases in these counties it was over before the end of August. A report from the Forehoe Union of Norfolk states "that the harvest of 1899 has been the lightest and quickest on record, and plenty of farmers were little over 14 days."

In the fen districts in Lincolnshire and Cambridgeshire the harvest is usually done by piecework. This year the men were able to get through their work very quickly, but fewer were employed than last year, when the heavy crops were much laid, and the self-binders could not be so generally used. In other parts of Lincolnshire and Cambridgeshire, in addition to the piecework system, a daily, weekly, or monthly wage is paid. Thus, on a farm in the Louth Union of Lincolnshire, where about 40 men were at work at harvest, some were employed at piecework at 5s. 6d. to 7s. per acre, each man taking 20 to 25 acres, while some were paid £7 a month, and others 5s. a day.

Turning to the Midland, Home, and Southern and South Western counties, in addition to the systems of payment already referred to, the custom is in some districts to pay the ordinary weekly wages, and, in addition, to give a bonus at the end of harvest, or else to pay overtime money; or to pay double the weekly wages during harvest; or to give extra wages for a month certain, and then pay the ordinary weekly wages. A large employer of labour in Northamptonshire writes that he paid the following rates:—"4s. 8d. per day during harvest month, but nearly all the men have piece work (cutting with the machine, mowing or tying), at which they earned from 5s. 6d. to 7s. per day, so that they received from £6 to £7 6s. for the month." Extra money, in addition to the usual weekly cash wages, was paid for harvest work done before and after the month.

The Northern counties have been excluded from the returns, as the majority of the men there are hired by the year or half-year, paid an "upstanding wage," that is, in wet weather and sickness, and given no extra money for harvest, though they are often supplied with extra food and drink. Except in Northumberland, where the system of engagement closely resembles that in the Border counties and the Lothians in Scotland, the married men attached to the staff of a farm are usually paid extra money wages, and often given food and drink. Extra hands in these districts, both English and Irish, get from £4 to £6 a month, frequently with an allowance of food and drink. In some of

the more Northern districts, the weather broke up before the harvest was all in, and some corn was still out early in October.

With regard to the supply of labour at harvest, a number of employers report that they had a difficulty in getting a sufficient supply of men, but it is generally stated that the increased use of the self-binders, which was noticeable on small as well as large farms, and the continuous spell of fine weather, enabled farmers to do with fewer hands.

CONSUMPTION OF POTATOES IN IRELAND.

In a recent report to the Commissioners of National Education, Ireland, Mr. Thomas Carroll, the Agricultural Superintendent, states that the value of the potato as an agricultural crop in Ireland varies considerably in different localities. In some districts the growing of potatoes is almost entirely neglected, whilst in others they form the great proportion of the cultivated crops of the farms.

As the staple food of the rural population, the potato does not occupy the position which it held some years ago. The cheapness of foreign flour has done much to reduce the value of the potato in the diet of the Irish peasantry. "A bit o' cake-bread and a drop of tay," will be the reply to an inquiry as to the present diet of the poorest peasantry in the country. Even the wholesome Indian meal is ousted from its position by the satisfying bread and tea diet.

Whilst the potato has decreased in importance as a general article of diet, it is still in extensive use over a large area of the country. The crop is easily cultivated; it is the most suitable crop for land inaccessible to thorough systems of cultivation by agricultural implements; and for pig-feeding there is no other root crop that can take its position.

EXPERIMENTS WITH PEAS FOR SEED.

The last report of the Department of Agriculture, Ontario, furnishes an account of the results of some experiments with seed peas which were carried out at the Experimental Farm at Guelph during the five years 1892 to 1897. One experiment was conducted with the object of ascertaining whether the use of cracked peas for seed was attended with any unsatisfactory results. In this case the yield of grain per acre from whole seed during five years ranged from 18.8 to 48.5 bushels, or an average of 29.30 bushels, whilst the yield of grain from cracked seed ranged from 4.4 to 20 bushels per acre, or an average of 9.78 bushels. In no year did the cracked peas give half so large a yield of grain per acre as was realised from the sound peas, and the latter on the average gave a yield three times as large as that produced by the peas which had been cracked by threshing.

Another experiment, which extended over two years, was undertaken to determine the comparative merits of the use of large and small peas for seed. In every instance large peas gave better results than small peas, producing on the average 26.2 bushels per acre against 22.6 bushels from small seed; in 1897 the results were nearly $5\frac{1}{2}$ bushels in favour of the large seed. The latter also produced grain which weighed 11b. per bushel more than that produced by the small peas.

Some further tests were made with peas which were injured by the pea weevil, and it was found that only 27 per cent. of the injured peas germinated.

THE KEEPING QUALITIES OF FERTILE AND INFERTILE EGGS.

An experiment has been carried out at the Ontario Agricultural College with the object of testing the keeping qualities of eggs laid by hens with which a male bird had been permitted to run, as compared with eggs laid by hens which had been kept apart from any male birds.

In the middle of July four dozen fertile eggs and three dozen infertile eggs were placed in an egg chest and subjected to a temperature varying from fifty to sixty degrees. These eggs were merely laid on their sides in bran and not turned. On examining some of the eggs a month after they were placed in the drawers no perceptible difference could be discerned; and this was practically the case when the second examination was made on September 15th. At the third examination, however, which took place on October 15th, it was noticed that the whites of the fertile eggs were somewhat more watery than those of the infertile eggs, but not much difference could be found in the yolks. A month later, on November 15th, the differences observed in October were found to be more manifest, the whites of the fertile eggs being quite watery, while those of the infertile specimens were to all appearance as good as in a newly-laid egg.

On the 12th of December, or five months after the commencement of the experiment, the remainder of the eggs were broken. It was found that the whites of the fertile eggs were like water; in some cases the yolks were broken, and where the yolks were intact they were very much spotted and discoloured, presenting every appearance of approaching decomposition. The fertile eggs were therefore totally unfit for table use, and of even a very poor quality for culinary purposes.

The infertile eggs, on the other hand, were found to be equal in quality to those usually sold for household use, though, of course, they could not be called new-laid. The whites were of normal consistency in every case, and the yolks were standing up exactly as in a new-laid egg.

It was noticed that among the fertile eggs the small eggs with white shells were in a much worse condition than the large eggs with white or brown shells.

EXPERIMENTS IN THE PRODUCTION OF PORK.

The Canadian Department of Agriculture has recently issued a bulletin containing a summary of the investigations

made at the Central Experimental Farm, Ottawa, during the past eight years in connection with the feeding and fattening of swine. A portion of the work is perhaps of local interest only, in so far as it relates to comparisons between different breeds of pigs and the cost of various kinds of foods in Canada. Many of the experiments are, however, of a more general character.

The investigations were undertaken with the object of determining the relative and actual feeding values of different kinds of grain fed in different ways to pigs. As regards preparation of the feed, it is stated that ground grain gave better returns for the amount fed than whole grain. Soaking, while not equivalent to grinding, still added materially to the value of the feed. It did not pay to cook food for swine where economy of pork production was the sole consideration.

Numerous experiments were made with particular kinds of food, and the general opinion that a mixed ration gave better results than a single variety of food only was confirmed. Pease seemed to be profitable; while potatoes, of which small tubers especially are frequently available, were found to be of very little nutritive value when fed raw at the Central Farm, but when cooked they were worth about one quarter as much as mixed grain. Skim milk was found to be a very valuable adjunct to any grain ration, and it is stated that, in addition to the value indicated by its chemical composition, its peculiar apparently stimulating action upon the growth of animals should be considered; it was also conducive to hard flesh, 100 lbs. of mixed grains were found to equal about 700 lbs. of skim milk. Wheat which could not be sold on account of having been affected by frost led to some experiments being undertaken to ascertain the approximate value of this injured grain as a feed for swine. It was found that it might profitably be used.

The advisability of feeding a full or limited ration to pigs was also investigated. No very conclusive results were obtained, but on the whole it appeared that pigs whose rations were limited (*i.e.*, pigs to which was given an amount "consider-

ably " less than they could eat) made more economical gains than those which were rushed.

Among other results of a more general nature brought out by these experiments may be mentioned the following :— There is a gradual increase in the quantity of feed consumed for every pound of gain in live weight after the average live weight exceeds 100 lbs.; and the greatest and most economical gains are made when the swine are able to eat the most feed in proportion to their weight. The most economical time to slaughter swine is when they weigh from 175 to 200 lbs. The average dressed weight of the swine was about 76·4 per cent. of the fasted weight. The type of animals influences the character of the meat more than breed; *i.e.*, the fact of an animal being a Yorkshire or a Tamworth will not insure a good bacon carcase, but it must also be of a rangy type and fed in a certain way. Feeding mixed meal (barley, pease, and oats) with milk usually insures firm meat. The greatest gains from a given amount of grain appear to be made when it is ground and soaked for twenty-four hours. If grain is fed whole, part of it is frequently voided without being digested. Maturity or ripeness of the animal affects the quality of the flesh.

BUTTER AND BACON TRADE OF QUEENSLAND.

The Board have received from the Agent-General for Queensland some information, taken from the Annual Report of the Treasurer of that colony, relating to the export trade of the colony in butter and bacon.

With regard to butter, it was anticipated that the trade of 1898 would show a large increase over 1897; but the dry weather had such an effect upon the milk supply that the exports fell far short of expectations. This year, however, the season has been favourable, and the stocks in hand are so large that the volume of exports will probably greatly exceed that of 1898.

The manufacture of butter now forms one of the staple industries of Queensland, and the ramifications of the trade are spreading. The climate and other conditions are said to be suitable, and farmers are paying more attention to the breeding and housing of their cattle. The export in 1897 amounted to 3,770 cwt., which was practically the beginning of the trade, though some local shipments were made in 1895. Last year it amounted to 7,820 cwt.; and in the present year the export is expected to reach 20,000 cwt.

The bacon industry is increasing, and an export trade has been established. Merchants have taken advantage of the trade opened up in the Philippine Islands, and have obtained a hold in that market. The number of pigs in the colony in 1898 amounted to 127,081, or 16,226 more than in the preceding year. Of this number 85,510 produced 6,973,000 lbs. of bacon, excluding the fresh and salt pork used by the farmers for home consumption. In addition, 216,194 lbs. of lard were made. The value of the export trade in bacon and hams has been increased from £7,904 in 1896 to £32,033 in 1898.

PRESERVATION OF EGGS.

The Union of Poultry Breeding Societies of the Province of Saxony offered early in the year prizes for the best practical processes for the preservation of eggs. The rules of the competition required that the eggs submitted by the competitors should be kept at the offices of the Union for six months during the summer, and tested at the end of that period by a Committee. The competition was divided into two sections, one for cooking, confectionery and kitchen eggs, the other for table eggs. For the latter it was a condition that the appearance of the eggs should not have suffered from the preservative treatment.

About 150 eggs were sent in for trial, and when the test took place on 31st October last not one specimen was found to be decomposed.

The first prize in the section for cooking eggs was awarded to specimens which been preserved in a solution of silicate of potassium. The eggs had been first dipped in warm lard and then allowed to cool with the lard on them, after which they were placed in a solution of 6 lbs. silicate of potassium and $6\frac{1}{2}$ gallons of water. The yolks, white, and flavour were found to be perfect, and there was no loss of weight.

In the second section for table eggs the first prize was also awarded to specimens which had been preserved in a solution of silicate of potassium. The appearance of these successful samples were stated to render them indistinguishable from newly-laid eggs, and on breaking the shells, the yolks and white were of normal consistency, and the flavour good. The process of preservation had consisted in first washing the eggs with a brush and then placing them in an air-tight box containing a 10 per cent. solution of silicate of potassium.

[*Deutsche Landwirthschaftliche Presse, XXVI. Jahrgang Nr. 89.*]

AGRICULTURE IN MALTA.

The annual Report relating to Malta during the year, 1898 which was recently published by the Colonial Office, contains some interesting information on the state of agriculture in the island and its adjoining dependencies.

The area of Malta, including Gozo and Comino, amounts to 75,111 acres, of which 44,165 acres, or nearly three-fifths of the whole surface, were under cultivation in 1898, and only 4,024 acres were returned as absolutely waste land. The soil, which is calcareous and very shallow, is deficient in humus and organic matter, but it is heavily manured. The system of land tenure is a four or eight years' lease, but waste land may be let for a longer period in order to encourage its cultivation.

The following table, which has been compiled from the

census of 1891, gives the description and extent of the 10,000 holdings which make up the cultivated area :—

Description of Land.	Number of Holdings.	Acreage.	Per cent. of Cultivated Land.	Average Extent of Holding.
		Acres.		Acres.
Fields - - - -	7,981	37,236	84·32	4·66
Mixed fields - - -	1,513	6,423	14·54	4·25
Fruit gardens - -	397	350	0·79	0·88
Market gardens - -	109	156	0·35	1·43

In the year 1898 the cereal crops consisted of wheat, barley, and a mixture of each sown together (*mischiato*), and covered an area of 13,189 acres, or 29·86 per cent. of the whole cultivated land. The average yield in bushels per acre was as follows: wheat, 22·56; *mischiato*, 25·02, and barley, 29·22. The gross production of wheat and mixed corn amounted to 32,087 imperial quarters. This quantity was equivalent to 1·42 bushels per head per annum for the civil population, for which the requirement is 7·21 bushels. There is therefore only a 75 days' supply raised in the colony. Pulse crops include broad beans, peas, and the common vetch, which are gathered green to supply the market; the chickpeas and chickling vetch, which are grown for forage.

Owing to Egyptian and American competition, the cultivation of the cotton plant has dwindled to the quantity required for home consumption. Vegetables are grown throughout the year on irrigated land and in open fields during the rainy season. The rent of irrigated land is from £3 per acre. Potatoes and onions are largely grown for exportation. The area under potatoes, of which two crops are raised, viz., one in the spring and another in the winter, amounts to about 5,000 acres.

Most of the land returned as pasture is barren rock, which only yields pulse in the holes and crevices where soil has collected. The *sulla* (*Hedysarum coronarium*), which is

a distinct feature of the local agriculture, is an essential forage crop in the rotation; indeed, it so benefits the soil, mechanically and chemically, that outgoing tenants receive compensation when they give up the land after a sulla crop.

The statistics giving the number of animals in the colony in 1898 do not separately distinguish the horses, mules, and asses, which together amounted to 8,862 animals, or one to every twenty inhabitants. The once famous Maltese donkey is reported to be very rarely seen, and the breed will probably become extinct unless preventive steps are taken in the matter. Mules, farm cattle, goats, sheep, and pigs are reared locally, but horses and meat cattle are imported. The number of sheep is given as 13,895, of which nearly half are found in Gozo. They yield milk, which is exclusively employed for the manufacture of cheese. Goats supply the fresh milk demand, and 2,500 of these animals are brought into the town of Valetta every day for milking purposes. The total number of goats in the colony exceeds 15,000, and in the year 1898 there were 7,058 pigs.

AGRICULTURE IN HOLLAND.

Holland has a total area, exclusive of lakes and rivers, of 8,040,000 acres, of which, according to the return for 1897, 5,163,000 acres, or 64 per cent., were occupied by orchards, nurseries, and garden land. The extent of the arable land was 2,142,000 acres, while meadows and permanent grass account for 2,928,000 acres. Of the corn crops returned in that year, rye is the principal, with an acreage of 527,216 acres; oats rank next with 331,457 acres; while wheat and barley follow with 153,632 acres and 89,710 acres respectively. Among the minor cereals and pulse are buckwheat, 77,165 acres; beans 95,330 acres; and peas, 67,337 acres. Potatoes were grown on 373,494 acres, roots and green crops for forage on 68,456 acres, and clover and rotation grasses on 156,650 acres. Of certain forage crops, mainly spurrey and turnips, two crops are taken in the year, and these occupied

in 1897, 244,740 acres. Industrial crops include sugar beet, 95,115 acres; oil seeds, 10,372 acres; hops, teasels, and garden seeds, 38,203 acres; flax, 25,770 acres; canaryseed, madder, and chicory, 4,404 acres; tobacco, 1,936 acres, and hemp, 625 acres. The area of fallow land in 1897 was 24,875 acres.

The average yields per acre of the principal corn crops and of potatoes in the five years 1893-1897 were as follows: wheat, 27.8 bushels; rye, 23.6 bushels; barley, 42.5 bushels; oats, 44.8 bushels; and potatoes, 202.9 bushels.

The live stock enumerated on December 1st, 1897, included 273,500 horses, 1,621,300 cattle, 729,100 sheep and lambs, 175,000 goats, and 653,500 swine. There were also 3,877,143 fowls, 14,061 turkeys, 418,348 ducks, 36,567 geese, and 2,935 swans. Of the cattle, 19,592 were bulls, 936,022 milch cows, 594,850 heifers and calves, 65,847 fat cows and oxen, and 5,007 draught oxen.

The total number of persons occupying agricultural holdings of $2\frac{1}{2}$ acres and upwards in area in 1897 was 169,011, of which 96,309, or nearly 57 per cent., were owners, and 72,702, or 43 per cent., were tenants. The number of persons holding farms exceeding 50 acres in area was only 25,567, or about 15 per cent. of the total, and of the 143,444 occupiers of holdings of 50 acres and under, 79,621 farmed $12\frac{1}{2}$ acres or less.

One feature of Dutch agriculture in recent years has been the development of stock rearing and dairy farming, accompanied by an extensive cultivation of forage crops. For a number of years the imports of grain of all kinds into the country have exceeded the exports, while on the other hand, the exports of dairy produce, margarine, and fresh meat, especially mutton, have been steadily growing. The increase in the numbers of live stock is shown not only by an absolute augmentation in the dimensions of the herds but also by an increase in the number of animals kept on a given area, owing to some extent, to greater attention being paid to stall-feeding than formerly, which has been facilitated by the importation of cheap fodder grain. Other branches of agriculture in which much progress has been made include the cultivation of sugar-

beet, which is fostered by a system of bounties, and the production of bulbs, seeds, and market-garden produce.

The importance of the dairy industry in the Netherlands is indicated by the large proportion of milch cows in the cattle herds of the country, and also by the steady growth in the number of butter and cheese factories, co-operative and otherwise. In 1896 there were 639 of these establishments in operation, and in the following twelve months 128 new factories were opened, so that in 1897 there were 702 butter and 65 cheese factories. The estimated gross production of butter and cheese in 1897 amounted to 104,281,846 lbs. and 142,113,882 lbs. respectively. Of the former, 39,140,700 lbs and of the cheese 38,248,100 lbs. were produced in factories and the remainder was made in farm dairies.

In connection with these remarks on the progress of dairying in Holland reference may be made to some interesting observations on certain features of Dutch farming contained in a report, recently issued by the Essex Technical Instruction Committee, on the results of a visit of a number of Essex agriculturists to the Netherlands. The districts visited were for the most part polder land, *i.e.*, land which had been reclaimed from the sea or marsh, protected by massive sea walls, and kept drained by pumping engines. The soil was either alluvial or peaty, of great depth, and, in many cases kept moist, even in time of drought, by maintaining the water in the canals at a constant level. On the farms in these districts all the cattle were found to be of the pure Dutch breed, which though in some respects inferior for beef production, is celebrated for the high milk yields furnished by the cows. With the object of improving the herds, the steer calves are usually fattened, while the heifers are reared and only killed if they turn out inferior milkers. The cows are kept in a condition of scrupulous cleanliness, and many of the herds are subjected to a periodical inspection for tuberculosis, which it is stated enables the meat, milk and live stock from such herds to command a ready sale. At a farm at Waddingsteen which was visited the average daily yield per cow in January was 14 $\frac{3}{4}$ pints, and in June 28 pints. The average annual yield of milk per cow in this herd during the last six

years is 880 gallons; the best cow in the herd gave 1,179 gallons in 1897 and 1,217 gallons in 1898. Premiums are offered in each district by the Government for the best bull, a condition of the award being that the animal shall be available at the request of any person living in the district, the customary charge for service being one florin (1s. 8d.).

The dairy farms of North Holland are stated to be particularly interesting as examples of small holdings. The farms vary in size between 40 and 60 acres. It is reckoned that each cow requires two acres of grass land: one acre for summer feed and one acre for hay. The milk from the farms can be disposed of in three ways: it can either be sold in the neighbouring town; or it can be made into cheese, in which case about half the cream will be converted into butter, and the whey from the cheese used for feeding pigs; or, lastly, it can be sent to a condensed milk factory. The price paid for the new milk at the factory is stated to be just over 3½d. per imperial gallon in summer and 5d. in winter. In many cases the farms are owned by the occupier, but where rented the rent varies between £3 and £4 per acre, the landlord paying all the outgoings. In the case of a farm of 60 acres at Hoogkarspel, the rent was £3 5s. per acre. The stock on this farm consisted of 20 cows, 3 calves, 3 heifers, 80 sheep, 4 horses and 20 pigs, the purchased feeding-stuffs used on this holding being 3 tons of oil-cake per annum. The labour was provided by the occupier, one indoor farm-servant and a labourer, with one or two extra hands for the hay harvest. The wages of the indoor servant were £10 per annum, while the labourer got 11s. 6d. per week, with breakfast and lunch.

The butter-making industry, as has been already observed, is largely in the hands of co-operative associations, those in the north being generally on a large scale, whilst in the south there are many small co-operative dairies, which are, however, gradually being transformed into cream-stations, so as to allow of the concentration of butter-making in larger factories. Co-operative cheese factories are a new development in the Edam cheese-making district of North Holland, where most of the farmers still make their own cheese.

A somewhat novel and interesting form of co-operation, mentioned as existing in South Holland, is the co-operative mart which has been established by an association of market gardeners and fruit growers, known as the Westland Society. By an arrangement with the society the inn-keeper of each of the seven villages in the district has provided an auction-room for the daily sale of market garden produce, and all the produce which is not sold privately is brought daily to the auction-room, and sold to buyers who attend the sales from Rotterdam, the Hague, and other large towns. That these marts have proved of great benefit is stated to be shown by the rapid extension of the gardens and the increase in glass-houses since the society came into existence and the marts were opened.

Wages in the purely agricultural districts visited were under, rather than over, those paid in Essex, and the hours of labour longer; but there was, it is stated, an appearance of contentment among the people, and no signs of pauperism were to be seen. The lowest customary wage was 1s. 8d. a day of 10 to 12 hours, which is stated to be from 30 to 40 per cent. below the rates current in Essex; but on one of the farms visited the labourers got a cottage rent free, and in North Holland certain meals are provided. It must also be mentioned that the women work in the fields along with the men, so that the earnings of a family may be considerable. The labouring classes lead frugal lives, and in the poorer districts rye bread is the staple food and tea the favourite beverage. It was found that the labour bill on many farms reached the high figure of £2 10s. per acre per annum, and it is thus evident that though individual wages may be low, the total amount expended on labour is high.

AGRICULTURAL HOLDINGS IN BELGIUM.

The Belgian Agricultural Inquiry of 1895 contains, in Volume III., tables relating to the number of holdings classified according to size and system of tenure. The total number

of such holdings (excluding woods) accounted for is 829,625, divided into four classes according to the status of the occupier—whether he be the owner or the tenant, and, as regards holdings cultivated partly by owner and partly by tenant, whether he occupy more or less than half. Assuming that one hectare is equivalent to $2\frac{1}{2}$ acres, the holdings may be grouped according to their size as follows :—

Size of Holding.	Occupied by Owner.		Occupied by Tenant.		Total.
	Whole.	More than Half.	More than Half.	Whole.	
	No.	No.	No.	No.	No.
$1\frac{1}{4}$ acres and under -	109,169	8,759	34,779	305,413	458,120
$1\frac{1}{4}$ to 5 acres -	27,395	19,544	58,829	70,465	176,233
5 to 10 „ -	12,089	13,873	30,340	25,006	81,308
10 to 50 „ -	16,690	18,909	33,443	28,387	97,429
50 to 100 „ -	2,021	1,497	3,315	4,517	11,350
Over 100 „ -	903	470	1,417	2,395	5,185
Total.	168,267	63,052	162,123	436,183	829,625

Belgium may thus be considered as essentially a country of small holdings, inasmuch as more than half of the total number are comprised in the first group, viz., that of holdings under 50 ares in extent ($1\frac{1}{4}$ acre). It is interesting to note also that more than half of the holdings are occupied in their entirety by tenants, while in the case of another fifth the owner occupies less than half the land. The tenants are, upon the whole, relatively somewhat more numerous in the small holdings, while it may further be noted that partial occupation by the owner and tenant is most common, not among the largest, but in the medium-sized properties (5—50 acres).

A consideration of the size of holdings in the different provinces presents two or three points of interest. The most striking contrast is afforded by a comparison of the two largest provinces, Luxemburg and Hainaut. The former is the greater, yet it contains but 43,773 agricultural holdings (Limbourg alone of the other provinces having less), while Hainaut has as many as 207,816, no fewer than 157,476 of which do not exceed $1\frac{1}{4}$ acre in extent. Of the 923 holdings

of over 250 acres in Belgium, 309 are in Namur. It is noteworthy also that the four provinces with over 100,000 holdings each, viz., Brabant, East and West Flanders, and Hainaut, form the most important dairying districts of Belgium, and are at the same time the only provinces containing over 100,000 milch cows apiece. It would seem, therefore, that in Belgium there is a close connection between small holdings and dairying.

Comparing further the system of tenure in the different provinces, and considering only the holdings which are entirely occupied by the owner or the tenant, the two Flanders are quite distinct from Hainaut, as the farming tenants outnumber the owners by seven or eight to one in the former, and are little more than double in the latter. Only in the province of Luxemburg are the occupying owners more numerous than the tenants, and here they number 19,000 against less than 8,000 tenants.

THE RUSSIAN HARVEST OF 1898.

Particulars of the acreage and production of the four principal cereals and of potatoes in the Russian Empire for the year 1898 have already been given in this Journal*, but the following additional details of the crops, as well as some observations by Mr. Consul-General Michell on the effect of the failure of the harvest in the eastern provinces on the agricultural population of these districts may be of interest.

According to the finally adjusted returns of the Central Statistical Department of the Ministry of the Interior, the area under cultivation of all grain and potatoes in 1898 in the 72 provinces and regions of the Empire amounted to 209,773,046 acres of arable land, of which 80,689,482 acres, were under winter-sown grain, and 120,237,428 acres represented spring-sown cereals, potatoes occupying 8,846,236 acres. The above areas yielded a total of grain and potatoes amounting to 1,516,026,375 cwts. Of this quantity winter-

*Vol. VI. No. 1, June, 1899.

sown crops yielded 441,708,428 cwts.; spring-sown, 602,890,393 cwts.; and potatoes, 471,427,554 cwts.

After deducting the requirements for seed the net production amounted to about 1,213,348,742 cwts., made up of 355,809,000 cwts. of winter-sown grain, 483,710,000 cwts. of spring-sown grain, and 373,830,000 of potatoes.

The total area under cultivation was smaller by 284,401 acres, or 0·1 per cent., than that of 1897, and greater by 8,404,833 acres, or by 4·2 per cent., than the average for the quinquennial period; at the same time the increase of the area of the potato and the spring-sown crops over that of winter-sown grain is observable from year to year.

The harvest of 1898 in 72 provinces and regions is reported by the Statistical Department to have yielded as under:—

	Area under Cultivation.		Total Yield.	
	1897.	1898.	1897.	1898.
	Acres.	Acres.	Cwts.	Cwts.
Wheat, winter sown	12,326,669	12,422,216	48,622,500	82,338,428
" spring "	34,411,721	34,601,528	133,042,500	162,940,500
Rye, winter sown	68,703,465	68,267,264	317,077,000	359,370,321
" spring "	1,768,058	1,814,859	9,039,536	8,228,250
Oats	42,226,691	41,657,649	189,040,178	195,824,571
Barley	20,260,759	20,607,250	101,959,714	131,127,107
Spelt wheat	1,183,987	1,178,347	4,704,535	1,982,571
Buckwheat	6,309,117	5,113,372	16,659,000	18,777,536
Millet	7,424,981	7,535,605	28,883,250	42,019,393
Maize	2,596,565	2,787,177	25,901,679	23,884,971
Peas	3,131,393	2,882,798	12,766,500	13,350,143
Lentils	946,730	966,548	3,348,321	3,090,214
Beans	202,154	192,291	1,546,393	1,449,964
Potatoes	8,579,699	8,846,236	444,358,571	471,427,714

The general yield of grain, though somewhat above the average, was almost a complete failure in the Eastern European provinces, namely those of Viatka, Simbirsk, Ufa, Samara, and Kazan. In these the yield of all the grain crops was only two-fifths of the average yield of the years 1893-97. The failure of the harvest in the above provinces would have been seriously felt by their population even had they been in a prosperous condition; unfortunately, the disaster in question affected the agricultural class already in an impoverished condition. The failure of the harvest, following, as it did, previous years of agricultural distress, has plunged these provinces into a condition from which they will not soon recover.

The indebtedness to the Crown, Zemstvo, and other relief funds of provinces, at one time the most fertile of the whole Empire, namely, some of those of the centre, Mid-Volga, and of the south-east, which had suffered from a failure of the harvests in 1891-92, amounted in 1897 to no less a sum than £3,578,354, and it stood at this high figure in spite of the considerable remissions of the Imperial Ukase of 1893, and Notifications of November, 1894. The failure of the harvest of 1898 in most of the above provinces will further augment the debt of the peasants now again stricken with famine. Starvation threatened them, and it became necessary to come to their rescue. The efforts of the Government, local authorities, Red Cross Society, and private individuals are being actively exerted on their behalf by grants in aid, public subscriptions, and other means. Unfortunately, however, relief on an extended scale was undertaken only when the effects of starvation in the shape of typhus, scurvy, and other diseases began to manifest themselves in many of the stricken districts in an epidemic form during the winter and spring.

The hay crop of the past year yielded 50,130,182 tons as compared with 45,380,356 tons gathered in the preceding year, or more by 10·5 per cent. The area under hay meadows is reckoned at 92,994,336 acres, or an increase of 1,049,074 as compared with 1897.

[*Foreign Office Report, Annual Series, No. 2343. Price 5d.*]

THE RANGE CATTLE SEASON OF 1899 AT CHICAGO.

Messrs. Clay, Robinson and Co., in the *Live Stock Journal* of 9th November, 1899, state that the season's receipts of range cattle at Chicago at the time of writing had amounted 177,300 head, a decrease of 18,000 from last year, and of 59,000 from 1897. Generally speaking, the season had been a very satisfactory one from the ranchman's point of view, as a good demand had prevailed throughout. Most of the animals were bought for dressed beef purposes, eastern shippers taking a smaller proportion than last year, and

exporters hardly any ; whereas in former years a good many were bought for the eastern markets and for export alive. The progress that has been made toward breeding better stock during the past few years by the use of pure-bred bulls on the ranges of the north-west is said to be very marked, and the present day ranger is approaching the ideal beef type, though there is still room for improvement.

In the matter of prices, range cattle producers have had no cause for complaint ; and not since 1891 have the prices been so high as this year. The extreme top price was \$5.40 per 100 lbs. (equivalent to 25s. 2d. per cwt.) for several small lots of Dakota and Montana hay-fed cattle. The highest price for any considerable number of straight rangers was, however, 25s. per cwt., obtained for 100 head of Dakotas, averaging 1,313 lbs. Range heifers sold up to 22s. 8d. per cwt. The course of values has been comparatively even throughout the season, the lowest level being reached during the latter part of September and the first week of October, when receipts were heaviest. The following table shows the top prices obtained for range cattle at Chicago during the past twelve years :—

Year.	Top Price.	Year.	Top Price.
	s. d.		s. d.
1899	25 2 per cwt.	1893	22 2 per cwt.
1898	23 4 "	1892	21 6 "
1897	22 10 "	1891	26 2 "
1896	19 10 "	1890	21 0 "
1895	23 10 "	1889	19 2 "
1894	22 10 "	1888	25 2 "

The season at Omaha is reported to have been most satisfactory ; one sale of 65 Wyoming steers averaging 1,510 lbs. having fetched 25s. per cwt., the highest price ever obtained for range beeves at that market. A good demand prevailed throughout the season for feeders, and a large number of this latter class have also been handled at Sioux City, which town, like Omaha, is near the centre of the great corn belt.

AGRICULTURE IN MEXICO.

The Consul-General of the United States, who is stationed at Monterey, has recently written a report containing information which is of interest in connection with an article which was published in an earlier part of this volume relating to the agricultural and economic conditions of Mexico.

It would appear that, owing to the scarcity of water, a large extent of land cannot be utilised in Mexico, where until recently farming was carried on in a very primitive way. During the last twenty years, however, modern implements have been introduced and great improvements have been thereby accomplished.

Cattle rearing is stated to be a very profitable business in Mexico, as the cost of labour is low, varying from sixpence to one shilling a day according to the locality; the taxes are also low; and there are large tracts of inexpensive land, which is suitable only for grazing.

The improvement of the stock has recently been taken in hand by interested persons and a successful result is anticipated. The great demand for meat which obtained in Cuba during the recent war between Spain and America increased the price of cattle to such an extent that the northern parts of Mexico were apparently depopulated of their stock, which cannot be fully replaced for many years.

Dairy farming is said to be remunerative in the neighbourhood of the large towns, where milk sells at one shilling per gallon, and butter at from 1s. 6d. to 2s. per pound. Wheat is cultivated in the high table-lands of Central Mexico. The crop appears to be a fairly profitable one, but the Consul mentions that the grain is not equal in quantity and quality to United States wheat.

Horticulture is growing into importance, inasmuch as fruit and vegetables can be produced in Mexico from four to eight weeks earlier than in the United States and the industry appears destined to assume large proportions.

ADULTERATION OF MILK AND BUTTER.

The Report of the Local Government Board for the year 1898-9 contains particulars of the results of the analyses of samples of food and drugs taken by the local authorities in 1898 under the powers conferred on them by the Sale of Food and Drugs Act, 1875. The total number of samples examined amounted to 49,555, of which 4,319 were found adulterated, showing a proportion of 8·7 per cent., which is the lowest percentage on record, and less than one-half of the rate for the years 1877 and 1878. The 49,555 samples analysed included 49,032 obtained by the officers of local authorities, of which 4,076, or 8·3 per cent., were condemned; the remaining 523 were submitted to the analysts by private purchasers and by agents of the Butter Association and the Royal Lancashire Agricultural Society, and of these as many as 243, or 46½ per cent., were reported against.

Of the total number above mentioned about two-fifths, or 20,315 cases, were samples of milk, of which 2,011, or 9·9 per cent., were condemned, and this is stated to be the first occasion on which the percentage of milk adulteration for the whole of England and Wales has fallen below 10 per cent. The corresponding rate for London was 12·9 per cent., compared with 14·6 per cent. in 1897 and 17·7 per cent. in 1896.

In twenty-one of the great towns included in the Registrar General's weekly returns, the proportion was less than in London, and the rate was below 3 per cent. in six of these towns, viz., Oldham, Huddersfield, Bradford, Cardiff, Salford, and Manchester. The total number of samples of milk taken in this group of towns was 2,154, of which 46, or 2·1 per cent., were declared to be adulterated. Another group of six other towns is mentioned in contradistinction, viz., Liverpool, Birmingham, West Ham, Sunderland, Portsmouth, and Nottingham, where 1,593 samples were analysed, and 323, or 20·3 per cent., were condemned. The great disparity here mentioned is partly attributed to the differences in the methods of procedure adopted by the analysts. But, however it may be, the Local Government Board Report states that in many towns there is room for great improvement in the quality of the milk supply.

Legal proceedings were taken against the vendors of 1,205 samples of milk out of the 2,011 samples condemned by the analysts, and in 986 cases penalties were imposed, amounting in all to £1,652 11s. 6d.

The samples of butter examined, or of what was sold as butter, were 9,375 in number, of which 998, or 10·6 per cent. were condemned. Of the 132 samples submitted to the analysts by private persons nearly two-thirds were condemned, and this large proportion is attributed to the fact that a private person is not likely to put himself to the trouble and expense of obtaining an analysis unless he has good grounds for supposing that he has been defrauded. The Royal Lancashire Agricultural Society and the Butter Association submitted 215 samples, of which 119, or 55 per cent., were condemned. This high rate is mainly due to the fact that the agents of the Society have acquired a remarkable degree of skill in the detection of offences, and they only take samples which long experience leads them to believe to be adulterated. Apart from the samples taken on behalf of these associations and by private purchasers, the rate of butter adulteration in London was 14·2 per cent.; 12·9 in the 32 great towns, and only 4·4 per cent. in the remainder of the country. Legal proceedings were taken in respect of 764 samples, and 679 penalties were inflicted, amounting to £1,844 18s. 10d.

Among other articles, 1,421 samples of lard were analysed, and all but two were found to be genuine; of cheese 534 samples were examined, and five condemned; of 1,013 samples of flour, 20 were reported against; and 333 samples of oatmeal were analysed and all passed as genuine.

INTERNATIONAL STATISTICAL INSTITUTE.

The seventh biennial meeting of the International Statistical Institute was held at Christiania, from the 2nd to 9th September last. Thirteen European countries, the United States of America, and, for the first time, the Empire of Japan were represented at this gathering. The three official dele-

gates representing Great Britain were Mr. A. E. Bateman, C.M.G., and Major P. G. Craigie, who attended on behalf of the Board of Trade and Board of Agriculture respectively; while Mr. J. A. Baines, C.S.I., was delegated by the Secretary of State for India. In the absence through ill-health of the president, Sir Rawson W. Rawson, K.C.M.G. (whose services have since unfortunately been lost to the Institute by death), M. Levasseur, the senior vice-president and one of the French official delegates, took the chair at the meetings.

A gracious reception was accorded on the 2nd September to the members and visitors by H.M. the King of Sweden and Norway at a levée held for the purpose at the Royal Palace of Christiania, and in commencing their formal business the Institute were welcomed in the name of his government by the Norwegian Minister of the Interior.

The deliberations of the Congress were for the most part conducted in two general sections, one for demographic and the other for economic statistics. In the latter section agricultural statistics occupied considerable attention. Major Craigie, in continuation of the tables submitted at the St. Petersburg meeting of 1897, contributed a note showing how far it was possible with existing data to make international comparisons of the stock of cattle and sheep in different countries now and 30 years ago, and drawing attention to the defective information as yet available in the statistics of many States. He submitted tables illustrating the density of the live stock maintained in different parts of the world so far as official records are supplied.

A general discussion was initiated at one of the sittings by the chairman, M. Levasseur, on the methods of collecting agricultural statistics, in which he submitted questions relating to the collection and tabulation of returns and especially as to the advisability of special decennial inquiries such as those resorted to in France in addition to the annual returns. The Russian, French, and British delegates took part in the debate, which afforded an opportunity for the presentation by the latter of a memorandum embodying, for the information of the Institute, a detailed settlement of the English system of returns, the fulness of which rendered

separate decennial inquiries unnecessary except in very special circumstances. The final general meeting, upon a proposal made by M. Timiriasew, who represented the Russian Ministry of Agriculture, decided to replace the existing committee on agriculture by an expert commissioner, to whom specific inquiries connected with the preparation of agricultural statistics, and the issue of crop forecasts should be entrusted, and who should present his report thereon at the subsequent meeting of the Institute; Major Craigie being selected as commissioner of the Institute on this subject, with M. Pilat, of the Bohemian, and M. Timiriasew, of the Russian Agricultural Departments as assistants in this task. The economic section also dealt with points arising in trade and industrial statistics; and Mr. Bateman submitted an interesting note on his further investigations into the comparability of trade statistics, directing attention more particularly on this occasion to the methods of entering goods stated to be in transit or for transshipment, or entered for temporary admission for subsequent re-exportation after undergoing some process of manufacture, and to the functions of free ports. Mr. Bateman communicated also to the Institute the progress made by his department of the Board of Trade in collecting international statistics. The statistics of prices in Russia were treated in a paper submitted by M. Blau.

M. Faure dealt with the data available for determining the taxation of property in different countries, M. Neymarck with the valuation of personal securities, M. de Foville with the statistics of precious metals and currency, and Dr. Stieda with historical questions relating to prices.

The Demographic Section was occupied with various subjects relating to census classification and population and vital statistics, with which were also included judicial statistics. For securing to the members of the Congress the facilities generously provided by the Norwegian hosts of the Institute, and for the completeness of the numerous arrangements made, the chief of the statistical department of Norway, M. Kier, was warmly thanked by the delegates who had the advantage and satisfaction of being present.

FOREST AREAS OF THE UNITED STATES.

A report recently presented by the United States Department of Agriculture to the House of Representatives contain, a review of the forest conditions of the United States, from which the following details of the forest areas of that country have been abstracted.

The natural forest area of the United States may be divided into three principal divisions. First, the Atlantic forest, covering mountains and valleys in the east, reaching westward to the Mississippi river, and beyond to the Indian Territory, and south into Texas, an area of about 1,361,000 square miles, mostly of mixed growth, hard woods, and conifers, with here and there large areas of coniferous growth alone. Second, the Pacific or Mountain forest of the west, covering the higher elevations of the Rocky Mountains, Sierra Nevada, and Coast Range, which may be estimated at 181,015 square miles, almost exclusively of coniferous growth. Third, the prairies, plains, and lower elevations and valleys of the west, with a scattered tree growth, chiefly confined to the river bottoms and other favourable situations, covering an area of about 1,428,000 square miles, of which 277,000 square miles may be considered under forest cover.

These vast areas of natural forest land have, of course, been materially diminished by the settlement of agricultural lands, which necessitated the removal of the forest from about 250 million acres, and also by two other causes, viz., forest fires and wood consumption. The larger amount of wood products is not secured by clearing lands, but mostly by cutting the best kinds and the best individual trees from the virgin forest, so that at least a wood growth, more or less valuable, continues to occupy the ground. Many of these areas are, however, so severely cut that they are of no economic value, especially when, as is often the case, fires follow the operations of the lumbermen, and the old timber and the young growth are destroyed, and the ground is occupied by weeds and useless brush. No accurate information is, however, avail-

able concerning the area which is not returned as agricultural land, and there is no precise knowledge as to its condition, whether virgin and valuable forest growth or useless brush, or whether it is waste but open country. In 1893, however, an estimate was made by the Department of Agriculture, which indicated that 350 million acres of the total area of the United States were farm lands, more than two-thirds of which were hewn out of the forest; that the productive area of forest growth, by no means all virgin, fell somewhat below 500 million acres; that nearly 450 million acres were open country, presumably incapable of producing any valuable forest growth on account of climatic deficiencies; leaving a balance of 600 million acres as brush and waste land, of which at least three-fourths have been made so by the combined efforts of axe and fire.

MOULD IN BUTTER CASKS.

Owing to complaints of the presence of mould in butter casks, the Finnish Department of Agriculture has recently undertaken an investigation on the origin of such mould. It has been generally supposed that it was due to the use of inferior materials for the casks, too thin parchment paper, and a too prolonged steeping in water of the casks prior to the butter being put in them. But the results of the inquiry indicate that neither of these practices nor the fact of a cask remaining too long on one bottom have anything to do with the formation of mould. They may perhaps to some extent advance the moulding, but it seems certain that the mould itself is due to infection.

Mould germs may, of course, locate themselves on the outside as well as the inside of the cask, both on and between the staves, and it seems probable that mould infection of the cask may as often occur at the place of production itself as in cellars and warehouses. Mould germs may no doubt also be found in the parchment paper. Indeed, the experiments have proved that the cask and the paper themselves are capable of

sustaining such mould developments as long as there is sufficient moisture. The growth is, however, slow, especially with scant access of air; but with more liberal access of air, with higher temperature, and if the butter is allowed to moisten casks and paper, the formation of mould goes on at a rapid rate. The more salt the liquid contains the slower the growth of mould, and when the percentage of salt is sufficiently high the mould germs do not grow at all. It was found by experiment that even in the most carefully cleaned and steamed casks, when the paper had been sterilised, mould would appear, and this must no doubt have originated from mould germs in the air. It was ascertained that careless packing greatly assisted the development of the mould germs.

So far as protective measures are concerned the following are some of the precautions recommended. The mould or mould germs should be removed or destroyed by scouring, brushing, or rinsing the casks in water to which soda or salt has been added, or by steaming the casks with hot steam for five to ten minutes. The parchment paper should be soaked in a strong solution of salt, or steamed, and tight casks used into which the butter should be packed as carefully and firmly as possible, avoiding empty spaces. The casks should be lined in the warm season with thick parchment paper, or by using two layers of thinner paper, and the inside of the cask should be sprinkled with salt immediately before placing the butter in it: the salt should previously have been placed on a hot stove for half an hour, and should be kept in closed stone or glass jars.

HAMBURG'S TRADE IN EGGS.

Mr. William Ward, Her Majesty's Consul-General at Hamburg, in a dispatch to the Foreign Office, states that there has been of late years a considerable development in Hamburg's import and export trade in eggs. The total value of the eggs imported into that port in 1898, by sea and

land, amounted to £1,208,200, whilst the exportations in the same year attained a value of £833,400. These figures were larger than the corresponding totals of 1897 and 1896, in which years the imports were valued at £1,203,200 and £1,125,400, and the exports at £833,000 and £799,400 respectively. The quantities arriving and despatched were, however, as will be seen from the accompanying tables, somewhat greater in 1897, so that the intrinsic value of the eggs was considered to be somewhat higher in the later year.

The consumption of eggs in Hamburg, which is now estimated to number nearly 700,000 inhabitants, is of course large; but the greater proportion of those brought thither are destined for re-exportation, and come chiefly from the interior of Germany by the Berlin-Hamburg railway, and through Lübeck from Russia. The importations by sea, which until four or five years ago were of trifling importance, have also been increasing in extent of late; for during the year 1898 the value of the direct importations by sea from the Baltic ports of Russia amounted to £131,500, as against £116,200 and £43,500 in 1897 and 1896 respectively. The impulse to the extension of this direct sea-borne trade between Russian ports and Hamburg has been given by the opening of the North Sea-Baltic Canal. Before that event Lübeck was the exclusive port of arrival for Russian eggs destined for the Hamburg market. In spite of this diversion of trade, the indirect importation *viâ* Lübeck did not diminish in any considerable degree until 1898; and the falling-off in the past year may possibly have been due to other causes. An increasing though limited import trade in eggs will be seen to exist between Morocco and Hamburg; whilst the imports from other countries are of very small account.

By far the most important consumer of eggs exported from Hamburg is the United Kingdom, for out of a total exportation of eggs to the value of £833,400 in 1898 no less than £732,900 worth were destined for this country. This total has varied little in the last three years. The exportations by sea to other countries are inconsiderable, France, Norway, and the Netherlands being the most important among them. The value of the eggs exported by rail to

the interior of Germany in 1898 was £60,100, as against £76,900 in 1897 and £60,400 in 1896; it is stated that all these eggs were the produce of Russia.

Hamburg: Imports of Eggs.

Source of Supply.	1896.	1897.	1898.
	Cwts.	Cwts.	Cwts.
From Morocco - - - -	7,325	5,828	7,218
.. Russian Baltic Ports - - -	32,122	69,948	69,736
.. United Kingdom - - - -	341	931	51
.. Other Countries - - - -	176	145	425
Total by Sea - - - -	39,964	76,852	77,430
By Berlin-Hamburg Railway - -	396,776	338,080	409,125
.. Lubeck-Hamburg Railway - -	141,837	157,168	117,603
.. Venlo-Hamburg Railway - -	7,556	9,393	10,030
.. Upper Elbe River - - - -	25,215	19,590	15,302
Total by Land or River - - -	571,374	574,231	552,060
Grand Total - - - -	611,338	651,083	629,490

Hamburg: Exports of Eggs.

Destination.	1896.	1897.	1898.
	Cwts.	Cwts.	Cwts.
To United Kingdom - - - -	391,429	397,021	377,202
.. France - - - -	1,286	3,748	17,881
.. Norway - - - -	830	2,062	1,868
.. Netherlands - - - -	184	1,159	1,571
.. Rhenish Prussia - - - -	—	1,294	349
.. Other Prussian Ports - - -	76	184	218
.. Other Countries - - - -	463	273	577
Total by Sea - - - -	394,268	405,741	399,666
By land and river to interior of Germany	32,263	41,065	31,690
Grand Total - - - -	426,531	446,806	431,356

DANISH ALLOTMENTS LAW.

The Board have received through the Foreign Office a translation of a law which came into force on 1st October last for the provision of allotments for agricultural labourers in Denmark. By this law, labourers, who must satisfy various conditions as to character, etc., can obtain a loan from the State equivalent to nine-tenths of the value of the land they desire to purchase. The land should be from about five to seven acres in extent, of medium quality; the limits may, however, be from $2\frac{3}{4}$ to $10\frac{3}{4}$ acres in the case of better or poorer land. The total value should not exceed 4,000 kr. (£222). The interest payable on the loan obtained from the State, which holds a mortgage upon the allotment, is three per cent. The loan itself is repayable (after the first five years) by annual instalments of four per cent. until half is paid off, the remainder by instalments of $3\frac{1}{2}$ per cent., including interest. Provision is, however, made for cases where the borrower desires to pay off the loan in larger sums. Regulations are laid down concerning the transfer of such properties, and also as regards testamentary dispositions.

The Treasury is empowered to devote a sum of 2,000,000 kr. (£111,111) annually for the next five years for loans of this nature; at the end of this period the law is subject to revision.

A committee of three persons, the members of which are paid, is to be organised in each county to aid the labourers in acquiring land under this Act, and to exercise a general supervision over the plots. The labourer is required to cultivate the land in the customary manner, and the necessary live stock, implements, and buildings must be kept up and maintained in good condition; he must also insure against fire.

BOUNTIES ON BEET SUGAR IN CHILE.

The Board of Trade have received, through the Foreign Office, a copy of a Bill approved by Congress for the payment

of bounties on the production of raw beet sugar in Chile. The Bill authorises the President of the Republic to pay two centavos per kilogram of raw beet sugar produced in the country, for six years dating from the 1st January, 1899.

The annual grant for the first year must not exceed 25,000 dollars currency; and increases by 25,000 dollars yearly until 1902, for which year, and for 1903 and 1904 it is fixed at a maximum of 100,000 dollars. Should these amounts not be sufficient to pay the bounty of two centavos per kilogram, they are to be divided proportionately to the quantity of sugar produced.

For a term of ten years the tariff for the transport of beets on the State railways shall not be raised to a rate higher than that obtaining on the 31st December, 1898.

During the same period the tariff for molasses and raw sugar, on first leaving the agricultural establishments and manufactories in full trucks, shall not exceed the tariffs now charged on articles of the fifth class.

To obtain the bounties the producers must furnish proof of the quantity produced; establish their legal domicile in Chile; and furnish any information which the President of the Republic may desire respecting the industry, as well as other data which may be conducive to the object aimed at in this law.

With reference to the above, it may be interesting to observe that on page 30 of the Report on Chile by Mr. T. Worthington, the Special Commissioner appointed by the Board of Trade to inquire into the conditions and prospects of British trade in South America, it was mentioned that the two principal sugar factories in Chile had bought up between them an extensive beet sugar factory, with modern equipment, erected within the last few years at a place called Parraí, on the railway between Santiago and Concepcion, which failed under its former owners through being unable to get the beetroot grown. It was stated, however, that the present owners of the factory are confident of being able to overcome this difficulty, and that the country is admirably suited to the growth of beets.

PROPOSED REGULATION OF THE GRAIN TRADE IN RUSSIA.

A Commission, numerously constituted, and appointed by the Russian Minister of Finance, held several sittings during the winter of 1897-98 for the purpose of considering the whole question of the Russian grain trade and devising means for its amelioration. This question formed the subject of deliberation of a similar Committee in 1893, but no practical results followed. The conclusions arrived at by the Committee of 1897-98, which were submitted for approval to the Ministers of Finance and Agriculture, were in the main directed to the establishment throughout the grain-producing districts of small granaries for the concentration therein of grain grown by the peasantry; and the establishment of a series of large grain elevators at certain railway points, at river wharfs and ports, and at the centres of the grain trade in the provinces. They also recommended that a maximum percentage of dross or extraneous matter in grain intended for export should be fixed by law, and that exchange, committees, with the approval of the Minister of Finance, should fix the standards of purity of grain for exportation.

The above proposals of the Commission have been referred for final drafting to a special Council of the Ministry of Finance and will be submitted to the Council of the Empire.

In regard to the inspection of grain at ports and harbours which was made optional by the Commission of 1893, much opposition is shown on account of the delays and vexations the trade would suffer from it, and of the great difficulty attending the establishment of purity and type standards for grain, which, wheat especially, is produced in such variety and under such varying conditions of soil and climate throughout the Russian Empire.

[*Foreign Office Report, Annual Series, No. 2343. Price 5d.*]

PRODUCTION AND EXPORT OF BEER AT HAMBURG.

According to Mr. W. Ward, H.M. Consul-General at Hamburg, there were in 1898 fifteen large breweries in or near

that city, their aggregate capital amounting to about one million pounds. It is stated that all these breweries together produce annually a little over 22,000,000 gallons of beer, but that this quantity could, if required, be easily increased by eight or nine million gallons. By far the larger portion of these 22,000,000 gallons are consumed in the district, only a comparatively small portion of the Hamburg-made beer being exported to foreign countries or to the interior of Germany. The beer made for exportation is of a stronger quality than that consumed on the spot, and is mostly subjected to pasteurisation, especially when destined for shipment to hot climates.

Hamburg is at present the most important continental port for the shipment of German and also of some quantities of Austrian beer; as well as of small amounts of British Norwegian, and Danish beers. Of the German beer exported hence a certain proportion is brewed at Hamburg, the remainder being chiefly of Bavarian origin. Nearly all the Austrian beer comes from Pilsen in Bohemia.

The export trade of beer from Hamburg, both of that brewed in this district and of that produced elsewhere in Germany, which had experienced a remarkable development between 1880 and 1890, has of late years lost much of its importance, owing to various economic, political, or fiscal causes. The decline in the exports since the city joined the Customs Union in 1888 has been fairly regular. From 5,159,000 gallons (valued at £748,000) in 1889 the shipments have fallen to 3,785,000 gallons (valued at £498,300) in 1897. Much of the decline is attributed to the restricted demand from France—Germany's best customer for beer—which country has during the last ten years considerably increased its own production. From Hamburg the largest quantities, some half a million gallons, now usually go to the United States, but appreciable amounts seem to be taken by most countries throughout the world.

To the United Kingdom there has also been a decline in the exports of beer from Hamburg, they having amounted to

* Foreign Office Report, Misc. Series, No. 485.

1,100,000 gallons in 1880, while in 1897 they were no more than 120,000 gallons. Most of the beer sent to this country has been intended for transshipment, and the decline is attributed to the development of direct steam communication between that port and various transoceanic countries. A certain amount of foreign beer is imported, mostly from the United Kingdom, and it may be noticed that Hamburg's imports of beer from this country, amounting to about 289,000 gallons on the average of the three years 1895-7, are at present greater than its exports to the United Kingdom.

FRUIT-GROWING IN CALIFORNIA.

Mr. Consul-General Pickersgill in his Report on Californian trade in 1898 says that the lack of sufficient rain, combined with successive hard frosts, caused the fruit crop of 1898 to fall much below the average, and in many parts of the State occasioned a complete failure. Cannerymen were obliged to pay unprecedented prices, and had great difficulty in obtaining enough fruit of good quality to execute their orders. Pears, plums, peaches, and apricots were all very scarce, the crop of the last-named fruit being less by about one-third than it was in 1897. There was a paucity of berries too, and cherries were far from plentiful. Walnuts were not only few in quantity, but were poorer in quality than usual, and almonds were almost entirely wanting. Early in the season there was a prospect of a bountiful yield of raisin grapes, but it led to disappointment.

Wine also was not obtained in such quantity as expected, and some of it turned out not altogether sound. In fact nothing did well except oranges and lemons, of which the crops were very large, and, for the most part, of fine quality.

But notwithstanding the low prices which have prevailed almost without interruption for several seasons, interest in fruit culture has not abated. Every year extensive additions

are made to the orchard area of California. According to the Assessors' Reports furnished to the Board of Equalisation in 1897, there were then 29,402,287 fruit trees in the State occupying an area of 452,252 acres, and including, *inter alia*, 1,577,000 apple trees; 1,520,000 pear trees, 5,522,000 peach trees, and 2,745,000 apricot trees.

[*Foreign Office Report, Annual Series, No. 2,349. Price 2½d.*]

FORESTS IN GERMANY.

The forests of Germany cover an area of 34,470,000 acres, or 26 per cent. of the entire land surface. A portion of the forests cover the poorer, chiefly sandy, soils of the north German plains, or occupy the rough, hilly, and steeper mountain lands of the numerous smaller mountain systems, and a small portion of the northern slopes of the Alps. They are distributed rather evenly over the entire Empire. Prussia, with 66 per cent. of the entire land surface, possesses 23·5 per cent. of forest land, while the rest of the larger States have each over 30 per cent., except Saxony, which has 27 per cent. With regard to the smaller districts of Prussia, Bavaria, and the smaller States, it is found that out of 64 provinces and districts 18 have less than 20 per cent. forest; 18 have from 20 to 29 per cent.; 23, including the greater part of the country, have from 30 to 39 per cent.; and 5 of the smaller districts have from 40 to 44 per cent. of forest. The districts containing less than 20 per cent. of forests are, as might be supposed, mostly fertile farming districts, in which the arable land forms over 40 per cent. of the soil, but they also include districts like Hanover and Luneburg, where poor, flat lands have been deforested and gradually transformed into heaths, and where an accumulation of bog-iron ore and other obstacles render the attempts at reforestation difficult, expensive, and unsatisfactory.

AGRICULTURAL LABOURERS AND WAGES IN BELGIUM.

According to the last Belgian agricultural census, the agricultural population of that country in 1895 numbered

1,204,810 persons of twelve years old and upwards. Of this number 1,015,799 (558,714 men and 457,085 women) were members of the family usually occupied in agricultural labour. Farm bailiffs, foremen, and the like numbered 1,905, and the remaining 187,106 were servants and permanent day-labourers, 128,277 being men, and 58,829 women. It would thus appear that over 40 per cent. of the persons engaged in agriculture in Belgium are women.

The average wages paid to men were, without food, about 1s. 7d. a day, and with food 11½d. a day, corresponding to 9s. 6d. and 5s. 10d. per week of six days. Women earned on the average about 11¾d. without food, and 7d. with food, or about 5s. 10d. and 3s. 7d. a week respectively. Wages differed considerably in different provinces, varying from an average of 11s. 8d. per week in Namur to 6s. 11d. in Limbourg. Women's wages were, however, highest in the province of Luxemburg, and lowest in Eastern Flanders.

Comparison with 1890, five years previously, appears to show that these wages have risen, on the whole, by an average of 1d. per week during the period throughout most of the kingdom. Only in Western Flanders is a decline recorded, while in the province of Luxemburg there has been an increase of something like 6d. per week.

The British Consul-General at San Francisco, in his Report on the trade of that port for the year 1898, **Advice to Settlers in California.** says that in view of the numerous instances that have been brought to his notice of British subjects having made a failure of the fruit-growing business in California, and having ruined themselves by unwise investments in land, he is constrained to reiterate the advice given in former reports to intending settlers. That advice is, not to invest in farming property until they have resided in the State at least one or two years, and have had an opportunity of studying the conditions personally, and of acquiring some practical knowledge of the particular

branch of husbandry in which they intend to engage. Intending settlers are warned of the importance of their observing this caution if they wish to escape the disasters which have overtaken so many of their inexperienced and confiding countrymen. Farms of almost every description may be rented or leased in any part of the State, and by adopting this method a prospective fruit grower is enabled to find out by actual experience whether he has an aptitude for the business or not. At the same time he will get a more reliable idea of what returns he may expect from his contemplated investment than he would have from any other source.

[*Foreign Office Report, Annual Series. No. 2349. Price 2½d.*]

The Board have received from the Foreign Office a copy of an official decree, which was published in the *Madrid Gazette* on September 29th last, whereby the duties which are imposed on wheat, and wheaten flour, under the existing Spanish tariff of imports, were re-established as follows:—Eight pesetas and thirteen pesetas twenty centimos respectively per hundred kilogrammes, which are equivalent to 13s. 11d. per quarter of wheat, and 5s. 4½d. per cwt. of wheaten flour. These duties were applicable after midnight of September 30th, 1899, to all consignments of wheat and wheat flour delivered from abroad at any port in Spain, the Balearic and Canary Islands.

Information has been received through the Foreign Office that phylloxera is very prevalent throughout the whole of Sicily. Nurseries of American vines have been created in various districts with a view to replacing the diseased plants by stocks immune from the pest, and the Italian Government has assigned a subsidy of £400 in aid of this work. As,

**Spanish Customs
Duty on Wheat.**

**Phylloxera in
Sicily.**

however, the old vines have to be completely destroyed before the new ones can be planted, the poorer growers are said to be hesitating to incur the expense.

The Board has received through the Foreign Office a copy of a circular (No. 87, 1899), issued by the Treasury Department of the United States, providing that all the animals imported into that country for breeding purposes, in order to claim admission free of duty, must be accompanied by a certificate of the pedigree, showing that the animal is pure-bred and has been admitted to full registry in a book of record established for that breed. Failing such certificate, the animal will be liable to the full customs duty. The circular contains a schedule of the books of record of recognised breeds of animals.

According to the *Smör Tidende*, at the dairy show recently held in St. Petersburg about 500 casks of butter from all districts were exhibited, amongst them being 45 brands from Siberia. The exhibits included many kinds of butter, besides the common salt butter for export, such as fresh butter churned from sweet cream, the so-called Paris-butter, which is commonly used in St. Petersburg, and other sorts. The butter was judged by Russian, Danish, German, and English experts, and was found to vary considerably in quality. The best samples were produced in the Baltic provinces and the Wologda district, while the Siberian butter ranked lowest in quality. According to the *Smör Tidende*, the success of the show is considered to be an indication of the prosperous condition of the dairy industry both in Russia proper and Siberia. In this connection it may be of interest to note that in recent years there has been a great increase in the imports of Russian butter into the

United Kingdom. In 1894 the quantity received was 79,000 cwts, but in 1898 over 180,000 cwts were credited to Russia, while in the previous year the receipts from the same source amounted to nearly 199,000 cwt. This butter is chiefly produced in the Finnish provinces.

Information has been received through the Foreign Office that the area under hops in Bavaria this year amounted to 55,350 acres, or a little more than in 1898, but some 8,000 acres less than in 1896 and 1897. The yield, however, seems to have been poor, the total production being given as 207,000 cwt., equivalent to $3\frac{3}{4}$ cwt. per acre. The quality was officially estimated to be good, but it was thought that the heavy rains and floods which had occurred might prove to have been the cause of injury.

The export of butter, which in the economy of Finland plays so considerable a part, declined in 1898 to the extent of over 40,000 casks or about 40,000 cwts., representing a value of about £280,000. The total export of butter during the year amounted to 244,000 cwts., against 284,000 cwts. in 1897. This decrease in the export is due partly to the increased prosperity within the country, which has made a greater home consumption of butter possible, whereby the export has naturally decreased, partly to the price of butter being comparatively low in the world's market owing to American and Australian competition, partly also to considerable tracts having been inundated in the spring, in consequence of which the hay harvest failed in many places and necessitated the slaughtering of the cattle.

The export of hops from Germany during the most important period of the year, *i.e.*, the last four months of 1898, amounted to 92,142 cwts., compared with 127,615 cwts. in the previous year. This decrease was owing to the diminished export to England. From September to December, 1897, this export amounted to 32,764 cwts., but in 1898 it only amounted to 13,391 cwts. The Bavarian Central Hop Association have petitioned the Bavarian Government for an increase in the import duty on hops. This increase has often been demanded by the hop-growers, and loud complaints have been made in Parliament that the duty had been unfairly reduced. The above-named union demand a tax of not less than £5, and also a prohibition of the mixture of Bavarian with other hops. The Bavarian Government, however, has asked the opinion of the Nuremberg Chamber of Commerce, with the following result: "The imposition of such a high duty as that proposed is decidedly injurious to German hop-growers, particularly as Great Britain, who has not hitherto hampered German trade by an import duty, might be induced by this means to do so."

[*Foreign Office Report, Annual Series, No. 2,344. Price 2½d.*]

Orchard pests have engaged the serious attention of Californian horticulturists for a number of years, and great success is said to have been attained by the introduction of insects which prey on the enemies of the fruit trees. It is claimed that this State is freer from such foes than any other in the United States. The "San José scale" has been almost entirely annihilated by parasites, and Australian lady-birds introduced through the agency of the Californian State Board of Horticulture, have practically exterminated the "cottony cushion scale." A like fate is overtaking the "black scale" at the jaws of another species of Australian lady-bird which has increased almost everywhere with

Orchard Pests in California.

astonishing results, so that many orchard-growers, especially those on the coast and in the bay counties, have abandoned artificial means for destroying the "black scale," and leave the work to nature. Fruit-growers are hoping investigations will be continued until natural enemies have been found for all the pests from which they suffer.

[*Foreign Office Report, Annual Series, No. 2,349. Price 2½d.*]

According to the Reports on the results of the Argentine Census of 1895 there were in the Republic
Meat Preserving in that year 39 meat preserving factories,
Factories in of which 16 were owned by Argentine
Argentina. proprietors or companies and 23 by
 foreigners. The number of animals dealt with in these
 establishments in 1894 was 695,404, including 582,168 cattle
 and 113,236 horses.

Mr. Consul Woodhouse, in his report to the Foreign Office
 on the trade of Riga, draws attention
Sunflower Seed to the use of sunflower seed cake, of which
Cake. considerable quantities are exported from
 the Riga District as food for cattle in Denmark. The
 Danes are expert dairy farmers and produce large quantities
 of butter, and it is said that some of their success is due to
 feeding their milch cows on this cake. Mr. Woodhouse would
 be glad to place his services at the disposal of anyone wishing
 to have samples of these sunflower cakes, which can be had
 in the shape of linseed cakes, long and ribbed, or flat and
 square. The Saratov cakes are the most popular.

[*Foreign Office Report, Annual Series, No. 2,342. Price 2d.*]

At the annual meeting of delegates from the Co-operative Agricultural Societies of Denmark recently held at Copenhagen, a lengthy discussion took place on pig breeding and

Danish Bacon Trade.

bacon curing. It was pointed out that in view of the increasing competition on the English markets, especially from Canada, it would be advisable to make efforts to further improve the quality of Danish bacon, and to this end it was recommended to improve the breed of pigs by crossing with the Yorkshire. It is intended to establish breeding-centres in different parts of the country, in order to enable the farmers to get suitable bacon-pigs. Some of the bacon factories have now published their dividends for the past year, from which business appears to have been fairly satisfactory. A few of the largest factories are arranging for the construction of special railway waggons for the conveyance of their foods to the ports, in order to ensure the best possible treatment of the bacon during transport. (*Smør Tidende.*)

According to the preliminary report on the results of the census taken on 31st December, 1897, the

Population of Spain

total population of Spain (*i.e.*, the Spanish peninsula and adjacent islands and possessions on the north and west coast of Africa) at that date was 18,089,500, as compared with 17,565,632 in 1887, the increase in 10 years being 523,868 persons, or about 0·3 per cent. per annum. Of the inhabitants enumerated at the recent census, 8,773,730 were males, and 9,315,770 were females; these numbers included 22,386 and 15,158 foreigners respectively.

The legal population, as distinct from the population present in the country was returned at 18,226,040 in 1897 and 17,673,838 in 1887.

The Board of Agriculture have received a copy of an Act which provides that all cattle imported **Importation of Cattle into Natal.** into the Colony of Natal must either be accompanied by a certificate, signed by a duly qualified veterinary surgeon of the country from which the cattle have been despatched, to the effect that they have prior to embarkation been subjected to the tuberculin test, and have thereby been proved to be free from tuberculosis; or be placed in quarantine on arrival and subjected to the tuberculin test, at the expense of the owner. If the cattle are free from tuberculosis, and from any other disease unfitting them for introduction into the Colony, they may be landed and forwarded to their destination. Animals affected with tuberculosis will be destroyed, unless the owner prefers to return or re-ship them; the carcase being disposed of as the owner may think fit, provided that the flesh be not considered unfit for food. The above provisions do not apply to cattle imported solely for slaughter.

Agricultural experiment stations are now in operation in all the States and territories of the United States, while agricultural experiments have been begun in Alaska with the aid of national funds. In the States of Alabama, Connecticut, New Jersey, and New York a separate station is maintained wholly or in part by State funds; and in Louisiana a station for sugar experiments is maintained partly by funds contributed by sugar-planters. Excluding the branch stations established in several States, the total number of stations is 54. Of these 52 receive the appropriation provided for in the Act of Congress of 1887. The total income of the stations during 1898 was £250,000, of which £150,000 was received from the National Government, the remainder coming from the following sources:—State Governments, £71,000; fees for analyses, £11,000; sales of farm produce, £14,000; and miscellaneous, £4,000.

In addition, the Office of Experiment Stations had an appropriation of £7,000. The stations employed 669 persons in the work of administration and enquiry, and during 1898 they published 406 annual reports and bulletins, in addition to a number of Press bulletins, which were widely reproduced in the agricultural and county papers.

According to a circular issued by the War Department at Washington, Santa Cruz and Matanzas
Imports of are added to the list of ports in Cuba
Breeding Cattle
into Cuba. where pure bred bulls and cows for breeding purposes may be admitted free of duty.

The German Consul at Cuzco reports that there exists in Peru a good demand for agricultural
Opening for
Agricultural machinery suitable for small concerns in
Machinery in Peru. the interior of that country. These machines, he says, have to be arranged in small sections in order to enable them to be made up in packages not over 165 pounds in weight for transportation on mules' backs. Manufacturers should say in their lists whether the respective machines are suitable for mule transportation or not, and give exact weights of the different sections. This is a point of great importance, and cannot be sufficiently impressed upon manufacturers' minds.

REPORTS ON FOREIGN CROPS.

CROPS IN THE UNITED STATES.

The official returns of the 1899 harvest show that the yield of maize is estimated at about 25·2 Winchester bushels per acre, as compared with a ten years' average of 24·3 bushels. A preliminary estimate of the area under this crop had been previously given as 3,835,000 acres more than last year, *i.e.*, about 81,557,000 acres, which would indicate a total yield of some 2,055,000,000 bushels.

The yield of oats was returned as 30·7 bushels, the ten year average being 25·8 bushels. On an area of about 25,500,000 acres this would amount to a total of some 783,000,000 bushels.

The yield of barley is given as 27 bushels per acre, as compared with an average of 23 bushels; the preliminary estimates of area amount to about 2,663,000 acres, giving a total production of about 72,000,000 bushels.

Of other crops, the area under potatoes appears to be about 2,583,000 acres; the yield is given as 88·7 bushels per acre, the total being thus nearly 230,000,000 bushels. The yield of hay is estimated at 1·35 tons per acre.

A telegram in *The Times* of the 16th December states that the official estimate of the wheat crop this year is 544,300,000 bushels, or 12·3 bushels per acre.

RUSSIAN HARVEST OF 1899.

According to a statement published in the *Russian Trade and Industries Gazette* of November 2nd, the Ministry of Agriculture at St. Petersburg has issued a preliminary estimate of the results of this year's harvest in Russia.

The yields of the principal crops are estimated as follows :—

Governments.		Wheat.	Rye.	Barley.	Oats.
50 Governments of European Russia	- -	Qrs. 37,565,000	Qrs. 87,802,000	Qrs. 22,312,000	Qrs. 77,287,000
Poland - - -	- -	2,544,000	8,311,000	2,330,000	5,676,000
Cis-Caucasia - -	- -	6,340,000	728,000	2,381,000	1,058,000
Total- - -	- -	46,449,000	96,841,000	27,023,000	84,021,000

CROPS IN ARGENTINA.

According to *La Agricultura* and *The Buenos Ayres Standard*, the reports received in November as to the forthcoming wheat crop in Argentina continued to be favourable; and though damage by hail was stated to have occurred in various places in Santa Fé, it was not widespread enough to cause any serious diminution of the crops considered as a whole. Locusts were reported to be present in some localities, but in smaller numbers than in previous years. Rain was wanted in Entre Rios, the north of Buenos Ayres, and the south of Santa Fé. On the whole, however, it is stated that there is every reason to believe that the forthcoming crop will be larger than that of last year.

It is reported that the area sown with wheat this year is the largest hitherto recorded.

THE FRENCH HARVEST OF 1899.

The French Ministry of Agriculture has now published the estimates of the production of the cereal harvest in France in 1899, and these figures, together with the estimated

area, are given below, compared with the finally-revised figures for the preceding year:—

Crop.	Area.		Production.	
	1898.	1899.	1898.	1899.
	Acres.	Acres.	Bushels.	Bushels.
Wheat - - -	17,200,366	17,090,918	352,264,410	354,765,125
Barley - - -	2,011,724	2,058,350	45,428,930	46,305,325
Oats - - -	9,602,137	9,720,808	269,676,435	264,858,825
Rye - - -	3,643,040	3,651,030	64,691,874	66,145,200
Mixed Corn - -	585,291	576,918	11,620,603	11,609,950

CROPS IN GERMANY.

The official report on the condition of the young crops in Germany in the middle of November states that comparatively warm weather had caused the autumn-sown crops to develop well. Wheat and rye might be considered as between average and good, being most promising in the South; field-mice were, however, causing some damage. These rodents were injuring the clover more seriously, and owing partly to them, and partly to the long summer drought, the condition of the clover was poor, particularly in the North, being very bad about Stralsund and Mecklenburg.

THE WHEAT HARVEST IN ITALY.

The production of wheat in Italy in the harvest of 1899 has, according to the *Bollettino di Notizie Agrarie*, yielded 133,650,000 bushels, this production being rather above the out-turn of 1898, which is now put at 133,100,000 bushels. The average annual yield of the preceding five years amounted to 118,008,000 bushels, or over $15\frac{1}{2}$ million bushels below that of the present harvest.

HARVEST IN SWEDEN.

Her Majesty's Consul at Gothenburg has transmitted a summary of the reports received by the Mercantile Association of Gothenburg relating to this year's crops in South and Central Sweden. The crop of hay turned out for the most part below the average owing to the dry and cold weather during the early part of the summer ; the quality, however, is said to be excellent and will to some extent make up for the shortness in quantity.

Rye and wheat, which in some localities suffered from the unsuitable weather during the winter, and appeared rather uneven, yielded an average crop of excellent quality.

Oats and barley, which on account of the drought during the latter part of the summer appeared short in growth, returned an under average crop.

Potatoes suffered greatly from the drought and frost, and with regard to quantity almost turned out a failure.

The beetroot crop, in consequence of the drought, was also below the average; in some localities, however, the percentage of sugar appears to be good.

PARLIAMENTARY PUBLICATIONS.

*Report of the Commissioners of National Education in Ireland*1898-9. [C.—9446.] *Price 1s. 2d.*

The Commissioners, reporting as to the position of agricultural education, state that 81,208 pupils were examined in agriculture in 1897-8 in the national schools, and that 55,056 passed. Instruction in the theory of agriculture, for which ordinary results fees are payable, is compulsory in the 4th, 5th, and 6th classes in all rural schools conducted by masters in Ireland. It is optional in the case of girls' schools where the teacher is qualified to give instruction.

There were 48 school farms in connection with the national schools in 1898. The boys in the advanced classes in these schools are examined in the practice as well as the theory of agriculture, and special fees are paid on the proficiency of the pupils, and on the satisfactory state of the farm. 817 pupils, of whom 702 passed, were examined in practical agriculture. In 37 of these schools payments were made to the pupils of agricultural classes for working on the small farms or gardens, under the direction of the teachers, assisted by agricultural monitors. There were 109 schools with gardens attached, for the management of which, and for the practical knowledge displayed by the pupils, special fees are also granted.

The total number of students of all classes attending the Albert Agricultural Institution at Glasnevin in 1897-8 amounted to 356. Arrangements were tentatively made for providing instruction in agricultural science to the classes attending the teachers' sessions; the experiment is stated to have been successful. 143 students in all attended the Munster Institution, Cork, in the session of 1898. The itinerant dairy instruction in the province has been produc-

tive of satisfactory results. Dairy instructresses visit the homes of the pupils, advising as to improvements generally, and it is stated that the reserve at first exhibited towards these visitors by the small farmers is largely decreasing.

The two creamery instructors have been fully occupied in the inspection of existing creameries, and in advising upon sites and plans for new erections. The services of these instructors are available for all creameries, but they have been most largely utilised by those on the co-operative principle.

Agricultural Statistics, Ireland, 1899. [C.—9490.]

Price 2½d.

This report contains detailed information relating to Irish Agricultural labourers, showing their distribution when at home in Ireland and their social position as measured by the extent of their holding, their relative proportion to the population, and the number and destination of those who left Irish ports from the 1st January to the 31st August, 1899. It is shown that in the month of June last there were 18,910 persons who either had left, or intended to leave their homes to seek employment as agricultural labourers elsewhere. The corresponding number for 1898 was 17,902, showing an increase of 1,008 in the present year. The proportion for the whole of Ireland, based upon the Census of 1891, works out this year to 4·0 per 1,000; but when considered by provinces it is found to have been 21·6 per 1,000 in Connaught, 1·8 in Ulster, 0·3 in Munster, and 0·1 in Leinster. An analysis by counties shows that the proportion of migratory labourers to the total population was highest in Mayo, Roscommon, Donegal, Galway, and Sligo—viz., 46·6, 17·3, 14·0, 9·8, and 9·8 respectively. Co. Mayo also appears in a more remarkable light from another point of view, inasmuch as 196 per 1,000 of its adult male population sought employment at a distance from their homes. In no other county does the proportion reach 7 per cent.

A small proportion of the migratory labourers are landholders, and they are proportionately more numerous in Connaught, where the average size of their holdings is also greater. The percentage of the migratory labourers who are not landholders is distinguished as follows:—Connaught 75·7, Leinster 79·0, Ulster 80·0, and Munster 95·6. It is only in Connaught that any number of these people hold farms exceeding 15 acres in area.

The proportion of Irish migratory labourers who sought work in England was 75·8 per cent.; 22·5 per cent. went to Scotland; and 1·7 per cent. did not leave their own country.

Deer Forests in the six Highland Crofting Counties. [H.C. 346. Price 1d.]

This return gives the name of each deer forest in Argyllshire, Inverness-shire, Ross and Cromarty, Sutherland, Caithness, and the Orkney and Shetland Islands. In the year 1898 these forests were assessed at £100,833 17s. od., and their area amounted to 2,287,297 acres, compared with 1,711,892 acres in 1883.

Tithe Rent-charge (Grants to counties and boroughs).
H.C. 363. Price 1d.

This return shows the share of each of the administrative counties and county boroughs of England and Wales in a sum of £87,000, distributed in proportion to the shares which the Local Government Board certified under Section 22 of the Local Government Act, 1888, to have been received during the year ended the 31st day of March, 1888, out of the grant from the Exchequer, discontinued after the passing of that Act.

PRICES OF LIVE STOCK RETURNED UNDER THE WEIGHING OF CATTLE ACT.

Returns of prices supplied to the Board of Agriculture from the places scheduled under the Markets and Fairs (Weighing of Cattle) Act show that during the third quarter of the year 267,782 cattle, 1,688,121 sheep, and 95,564 swine were exposed for sale at the markets in the 21 places from which particulars are obtained. The numbers of each class of stock weighed and priced, as compared with those returned for the corresponding quarter of 1898, were as follows :—

Animals.	3rd Quarter, 1899.	3rd Quarter, 1898.
CATTLE :	No.	No.
Entering markets - - - -	267,782	262,395
Weighed - - - -	32,552	32,274
Prices returned - - - -	28,917	28,799
Prices returned with quality distinguished - - - -	24,036	23,804
SHEEP :		
Entering markets - - - -	1,688,121	1,593,030
Weighed - - - -	13,711	12,878
Prices returned with quality distinguished - - - -	11,578	10,956
SWINE :		
Entering markets - - - -	95,564	75,125
Weighed - - - -	710	479
Prices returned with quality distinguished - - - -	705	467

The number of cattle entering the markets during the three months was somewhat larger than last year, and there was also a slight, though not quite so large a proportionate, increase in the number of those weighed. The actual percentage of cattle weighed at all the scheduled markets was

12·16, but as usual the average for Scotland far exceeded that for England, being 31·26 per cent. as compared with 6·09. The numbers of sheep and swine exposed for sale were in excess of those returned for the corresponding period of 1898, but the number weighed of these classes of animals is still too small to afford any reliable basis for calculation. At four places—viz., Birmingham, Bristol, Lincoln, and York—where the weighbridge is seldom in request, it has not apparently been used on any single occasion during the three months.

While from all the scheduled places in Scotland sufficient statistical data as to prices of fat cattle weighed are received to enable them to be included in the following table, only six of the similar places in England furnish returns at all adequate to be taken into account in calculating prices.

PLACES.	INFERIOR or Third Quality.			GOOD or Second Quality.			PRIME or First Quality.		
	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.
Carlisle - -	546	s. d. 3 5	s. d. 27 4	535	s. d. 3 9½	s. d. 30 6	700	s. d. 4 3	s. d. 34 0
Leeds - -	—	—	—	8	3 7	28 8	182	4 0½	32 2
Liverpool - -	—	—	—	295	3 9	30 0	2,029	4 2½	33 8
London - -	14	3 1½	25 2	660	4 1½	33 2	819	4 7½	37 0
Newcastle - -	2	3 5½	27 10	144	3 11½	31 10	332	4 7½	37 0
Shrewsbury - -	71	3 2½	25 10	334	3 9½	30 4	204	4 3	34 0
Aberdeen - -	1,192	3 2	25 4	2,317	4 2½	33 8	1,581	4 8½	37 6
Dundee - -	282	3 4½	27 2	911	4 2	33 4	705	4 6	36 0
Edinburgh - -	—	—	—	2,802	4 4½	34 10	209	4 9	38 0
Falkirk - -	113	3 8	29 4	558	4 2½	33 8	346	4 6½	36 4
Glasgow - -	321	3 11½	31 8	868	4 2	33 4	2,443	4 5	35 4
Perth - -	8	3 6½	28 4	123	4 2½	33 8	191	4 6½	36 6

The prices realised for cattle of first quality ranged from 4s. 0¼d. per stone (32s. 2d. per cwt.) at Leeds to 4s. 9d. per stone (38s. per cwt.) at Edinburgh. For second quality beasts, ignoring the return from Leeds, which is based on too small a number of animals to be of value, the prices ranged from 3s. 9d. per stone (30s. per cwt.) at Liverpool to 4s. 4¼d. per stone (34s. 10d. per cwt.) at Edinburgh.

The prices per cwt. at the places above enumerated compare as follows with those prevailing during the same period last year:—

PLACES.	INFERIOR or Third Quality.		GOOD or Second Quality.		PRIME or First Quality.	
	1899.	1898.	1899.	1898.	1899.	1898.
	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Carlisle - -	27 4	26 6	30 6	30 2	34 0	32 6
Leeds - - -	—	28 0	28 8	29 0	32 2	32 0
Liverpool - -	—	—	30 0	28 6	33 8	32 8
London - - -	25 2	23 6	33 2	32 2	37 0	35 6
Newcastle - -	27 10	26 4	31 10	29 10	37 0	34 2
Shrewsbury - -	25 10	24 4	30 4	29 6	34 0	34 2
Aberdeen - -	25 4	24 0	33 8	31 6	37 6	34 6
Dundee - - -	27 2	26 8	33 4	31 2	36 0	33 2
Edinburgh - -	—	—	34 10	33 0	38 0	33 10
Falkirk - - -	29 4	28 6	33 8	31 8	36 4	33 10
Glasgow - - -	31 8	30 10	33 4	32 2	35 4	33 6
Perth - - -	28 4	30 2	33 8	32 6	36 6	34 8

It will be observed that, as was the case in the June quarter, the averages this year indicate a prevalence of better prices than in 1898. When, however, as in the next table, the monthly prices of the two better qualities of fat cattle are calculated, it appears that there was a serious fall in values during the three months, and that the relatively satisfactory figures for the whole quarter are largely due to the transactions of July.

MONTHS.	Good or Second Quality.		Prime or First Quality.	
	Per Stone.	Per Cwt.	Per Stone.	Per Cwt.
	s. d.	s. d.	s. d.	s. d.
July - - - -	4 5	35 4	4 7½	37 0
August - - -	4 2	33 4	4 5½	35 6
September - -	4 0½	32 2	4 3½	34 2

The prices thus recorded for the month of September are lower than in any previous month of the current year, having

returned to and fallen slightly below those of January. An examination of this table with the similar tables given in the *Journal* for preceding months tends to show that the level of prices for fat cattle rose month by month until June, remained at its highest in July, and then fell in the two months, August and September, to the point from which it started in January.

Returns of cattle which were actually sold by live weight, *i.e.*, at a rate per stone or per cwt. previously agreed upon, were more numerous in the third than in either the first or second quarter of the year, the total being 4,046 fat beasts and 88 stores, although the places at which such transactions take place are still very few. The prices calculated from these sales alone would show a range for prime fat cattle of from 4s. 1½d. per stone at Liverpool to 4s. 9½d. at Edinburgh, and for second quality cattle from 4s. 0¼d. per stone at Edinburgh and London to 4s. 4d. per stone at Dundee.

The weighing of store cattle appears still to be practically confined to Shrewsbury, among the returning markets, although a few were also subjected to the test of the scales at Aberdeen, Dundee, Edinburgh and Glasgow.

The usual table is appended giving details of the stock of all kinds entering and weighed at each of the scheduled markets.

Cattle, Sheep, and Swine, entering the Markets and Marts of the undermentioned Places, with the Number Weighed, as received from the Market Authorities in the **Third Quarter** of 1899, under the Markets and Fairs (Weighing of Cattle Act, 1891 (54 & 55 Vict. c. 70)).

PLACES.	Cattle.			Sheep.			Swine.		
	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.
ENGLAND.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Ashford - - -	3,340	13	—	42,538	—	—	4,224	—	—
Birmingham - -	5,925	—	—	40,658	—	—	43,996	—	—
Bristol - - -	6,692	—	—	35,663	—	—	—	—	—
Carlisle - - -	12,634	1,781	1,781	127,409	—	—	3,709	—	—
Leicester - - -	14,686	351	277	27,065	—	—	1,454	—	—
Leeds - - -	8,066	190	190	36,670	71	71	672	—	—
Lincoln - - -	1,570	—	—	14,475	—	—	2,444	—	—
Liverpool - - -	14,333	2,324	2,324	177,983	1,643	1,643	—	—	—
London - - -	21,370	3,763	1,493	168,460	2,138	20	—	—	—
Newcastle-upon-Tyne	25,109	478	478	131,573	—	—	9,012	610	610
Norwich - - -	13,545	2	2	74,776	—	—	7,647	—	—
Salford - - -	27,671	551	—	213,206	—	—	914	—	—
Shrewsbury - - -	3,819	1,937	1,865	46,909	15	—	6,810	—	—
Wakefield - - -	21,677	991	454	64,058	—	—	4,585	5	—
York - - -	16,752	—	—	65,891	—	—	32	—	—
SCOTLAND.									
Aberdeen - - -	12,111	5,118	5,118	91,162	8,912	8,912	4,576	—	—
Dundee - - -	4,573	1,924	1,924	9,090	547	547	447	—	—
Edinburgh - - -	16,037	6,522	*3,109	62,795	—	—	1,965	—	—
Falkirk - - -	2,449	1,017	1,017	4,065	—	—	21	—	—
Glasgow - - -	18,830	3,739	3,682	166,070	40	40	1,132	3	3
Perth - - -	11,468	1,851	*322	87,605	345	345	1,354	92	92
TOTAL for ENGLAND	203,264	12,381	8,864	1,267,334	3,867	1,734	85,569	615	610
TOTAL for SCOTLAND	64,513	20,171	*15,172	420,787	9,844	9,844	9,995	95	95
Total - - -	267,777	32,552	*24,036	1,688,121	13,711	11,578	95,564	710	705

* Prices for 3,352 cattle in addition to the above were quoted from Edinburgh and for 1,509 cattle from Perth, but without distinguishing the quality.

AVERAGE WHOLESALE PRICES of CATTLE and SHEEP, per Stone of 8 lbs., sinking the offal, at the METROPOLITAN CATTLE MARKET, during the undermentioned Quarters of 1898 and 1899.

PERIOD.	CATTLE.			SHEEP.		
	Inferior.	Second.	First.	Inferior.	Second.	First.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
3rd Quarter, 1898	2 4	3 8	4 3	3 1	4 8	5 5
4th Quarter „	2 5	3 9	4 5	3 3	4 10	5 7
1st Quarter, 1899	2 6	3 11	4 6	3 5	4 11	5 8
2nd Quarter „	2 7	3 11	4 6	3 4	5 1	5 9
3rd Quarter „	2 4	3 11	4 7	3 3	4 11	5 8

AVERAGE WHOLESALE PRICES OF BEEF and MUTTON, per Stone of 8 lbs., by the Carcase, at LIVERPOOL and GLASGOW, during the under-mentioned Quarters of 1898 and 1899.

PERIOD.	LIVERPOOL.*				GLASGOW.†			
	BEEF.		MUTTON.		BEEF.		MUTTON.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
3rd Quarter, 1898	2 4 to 3	3 6	3 2 to 4	4 8	2 4 to 3	3 6	3 4 to 4	4 6
4th Quarter „	2 4 „ 3	3 8	3 4 „ 4	4 8	2 8 „ 3	3 10	3 0 „ 4	4 6
1st Quarter, 1899	2 6 „ 3	3 9	4 2 „ 4	4 10	2 10 „ 3	3 8	3 8 „ 4	4 4
2nd Quarter „	2 4 „ 3	3 8	4 0 „ 5	4 4	3 0 „ 4	4 2	4 4 „ 5	4 4
3rd Quarter „	2 4 „ 3	3 8	3 0 „ 5	4 0	2 4 „ 3	3 8	3 4 „ 4	4 4

* Compiled from information furnished by the Medical Officer of Health, Liverpool. The prices quoted are for Carcases of Animals *slaughtered at the Liverpool Abattoir*, and do not apply to Imported Meat.

† Compiled from information furnished by the Principal of the Veterinary College, Glasgow.

BERLIN MARKET.

AVERAGE PRICES of CATTLE and SHEEP (First Quality Dead Weight) in the BERLIN CATTLE MARKET in the under-mentioned Months of 1899.

MONTHS.	CATTLE.		SHEEP.	
	Per Cwt.		Per Cwt.	
1899.	s. d.	s. d.	s. d.	s. d.
September - - -	62 9	to 67 5	63 2	to 65 7
October - - -	63 2	„ 67 2	63 2	„ 66 2
November - - -	63 5	„ 66 11	62 10	„ 65 11

NOTE.—The above prices have been compiled from the weekly returns published in the *Deutsche Landwirtschaftliche Presse*.

PARIS MARKET.

AVERAGE PRICES of CATTLE, SHEEP, and SWINE (Medium Quality) in the PARIS CATTLE MARKET in the under-mentioned Months of 1899.

MONTHS.	OXEN.	CALVES.	SHEEP.	PIGS.
	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.
LIVE WEIGHT.				
1899.	s. d.	s. d.	s. d.	s. d.
September - -	29 4	38 11	33 7	40 6
October - -	28 11	38 11	32 7	40 4
November - -				
DEAD WEIGHT.				
1899.	s. d.	s. d.	s. d.	s. d.
September - -	48 7	65 2	66 7	57 10
October - -	48 10	65 4	65 7	58 0
November - -				

NOTE.—The above prices have been compiled from the weekly returns published in the *Journal d'Agriculture Pratique*.

CHICAGO.

PRICES of CATTLE at CHICAGO per Cwt. (Live Weight) in the under-mentioned Months of 1899.

Months.	Good Dressed Beef and Shipping Steers.		Export Cattle.		Extra Prime Cattle.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1899.						
September	26 5	to 28 11	25 9	to 29 3	29 8	to 31 9
October	25 9	„ 28 4	25 4	„ 29 3	29 8	„ 32 2
November	24 11	„ 28 1	24 11	„ 29 8	30 2	„ 32 3

Compiled from the Live Stock Reports issued by Messrs. Clay, Robinson, and Co., of the Union Stock Yards, Chicago, Illinois.

AVERAGE VALUES, per Cwt., of various Kinds of DEAD MEAT Imported into the United Kingdom from FOREIGN COUNTRIES and BRITISH POSSESSIONS in the under-mentioned Quarters of 1898 and 1899.

(Computed from the Trade and Navigation Accounts.)

PERIOD.	BEEF.		MUTTON.	PORK.		BACON.	HAMS
	Fresh.	Salted.	Fresh.	Fresh.	Salted.		
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
3rd Quarter, 1898 -	37 8	26 1	30 0	41 9	20 5	37 1	39 1
4th Quarter „ -	35 3	25 10	29 8	41 1	23 7	36 8	40 2
1st Quarter, 1899 -	39 4	26 1	30 6	40 10	24 5	34 3	38 7
2nd Quarter „ -	39 6	26 6	32 6	41 9	20 2	35 4	38 9
3rd Quarter „ -	38 0	24 2	31 3	42 9	19 6	36 3	43 2

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels,* computed from the Weekly Averages of Corn Returns from the 196 Returning Markets of ENGLAND AND WALES, pursuant to the Corn Returns Act, 1882, together with the QUANTITIES returned as sold at such Markets, in the under-noted periods of the Years 1899, 1898, and 1897.

QUARTER ENDED	PRICES.			QUANTITIES.		
	1899.	1898.	1897.	1899.	1898.	1897.
Wheat.						
Lady Day - - -	<i>s. d.</i> 26 3	<i>s. d.</i> 35 1	<i>s. d.</i> 29 7	<i>Quarters.</i> 868,579	<i>Quarters.</i> 699,657	<i>Quarters.</i> 619,679
Midsummer - - -	25 1	41 5	27 6	994,293	557,504	619,618
Michaelmas - - -	25 2	32 8	30 4	754,667	308,279	635,698
Christmas - - -	—	27 2	33 3	—	1,036,975	881,566
Barley.						
Lady Day - - -	<i>s. d.</i> 27 1	<i>s. d.</i> 27 9	<i>s. d.</i> 24 0	<i>Quarters.</i> 830,398	<i>Quarters.</i> 902,452	<i>Quarters.</i> 784,713
Midsummer - - -	24 6	26 10	21 4	92,648	47,621	78,488
Michaelmas - - -	24 4	25 10	21 6	237,935	99,743	118,875
Christmas - - -	—	28 2	27 0	—	2,603,841	2,275,111
Oats.						
Lady Day - - -	<i>s. d.</i> 16 11	<i>s. d.</i> 17 5	<i>s. d.</i> 16 4	<i>Quarters.</i> 251,841	<i>Quarters.</i> 226,150	<i>Quarters.</i> 194,193
Midsummer - - -	17 6	19 10	17 3	137,834	93,475	79,707
Michaelmas - - -	17 3	19 7	17 10	147,902	78,787	75,824
Christmas - - -	—	16 11	16 5	—	289,652	200,710

* Section 8 of the Corn Returns Act, 1882, provides that where returns of purchases of British Corn are made to the local inspector of Corn Returns in any other measure than the imperial bushel, or by weight or by a weighed measure, that officer shall convert such returns into the imperial bushel, and in the case of weight or weighed measure the conversion is to be made at the rate of 60 imperial pounds for every bushel of wheat, 50 imperial pounds for every bushel of barley, and 39 imperial pounds for every bushel of oats.

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Returns received under the Corn Returns Act, 1882, in each of the under-mentioned Weeks in 1899, and in the corresponding Weeks in 1898 and 1897.

Weeks ended (<i>in</i> 1899).	Wheat.			Barley.			Oats.		
	1899.	1898.	1897.	1899.	1898.	1897.	1899.	1898.	1897.
Jan. 7 -	s. d. 27 0	s. d. 34 11	s. d. 31 1	s. d. 28 3	s. d. 27 9	s. d. 25 5	s. d. 17 0	s. d. 16 10	s. d. 16 3
" 14 -	27 2	35 0	31 8	28 2	27 8	24 10	17 1	17 4	16 5
" 21 -	27 0	34 11	31 7	27 11	27 10	25 5	17 1	17 5	16 6
" 28 -	26 7	34 6	31 3	27 9	27 8	24 7	17 0	17 2	16 8
Feb. 4 -	26 6	34 10	30 7	27 2	28 0	24 10	17 0	17 6	16 7
" 11 -	26 8	35 1	29 8	27 2	27 8	24 8	17 0	17 5	16 6
" 18 -	26 0	35 0	28 11	26 10	27 11	23 9	16 11	17 8	16 5
" 25 -	25 7	35 5	28 2	26 7	27 6	23 8	16 11	17 10	16 3
Mar. 4 -	25 8	35 10	28 3	26 7	28 0	23 0	17 0	17 11	16 3
" 11 -	25 10	35 8	27 11	26 7	27 10	22 11	16 11	17 9	16 2
" 18 -	25 10	35 6	27 11	26 3	28 0	22 8	16 10	17 10	16 2
" 25 -	25 4	35 4	27 9	26 8	28 6	22 5	17 0	17 8	16 3
Apl. 1 -	24 11	35 3	27 10	26 2	27 11	22 3	16 11	17 10	16 3
" 8 -	24 7	35 2	27 8	25 1	27 0	22 7	16 11	17 11	16 6
" 15 -	24 6	35 3	27 0	25 7	28 0	23 0	16 10	18 2	16 3
" 22 -	24 8	36 1	26 6	25 2	28 3	20 7	17 1	18 4	16 7
" 29 -	25 0	38 4	27 9	25 10	27 10	20 5	17 5	18 11	17 3
May 6 -	25 3	42 4	28 4	24 5	27 8	21 5	17 6	20 4	16 11
" 13 -	25 4	45 11	27 11	23 11	27 1	20 2	17 9	21 1	17 7
" 20 -	25 3	48 1	28 1	23 11	26 0	19 10	17 10	21 3	17 9
" 27 -	25 2	47 9	28 2	23 8	26 5	21 3	17 8	21 5	17 10
June 3 -	25 4	46 3	27 10	24 4	26 10	20 8	18 1	21 0	17 9
" 10 -	25 6	45 4	27 4	21 10	25 8	22 8	18 2	20 11	17 11
" 17 -	25 7	42 4	27 0	23 1	26 1	23 9	17 10	20 5	18 0
" 24 -	25 7	40 8	27 0	26 2	24 3	19 9	17 11	20 7	18 6
July 1 -	25 7	38 3	27 1	24 2	23 4	18 10	18 0	20 8	18 7
" 8 -	25 7	36 10	27 4	21 9	25 0	17 4	18 1	20 5	18 8
" 15 -	25 5	37 1	27 7	20 4	24 1	17 6	17 11	20 10	18 3
" 22 -	25 5	38 1	28 1	21 10	25 0	18 10	18 0	20 10	18 11
" 29 -	25 2	36 11	28 10	22 5	24 2	17 10	18 2	20 11	19 0
Aug. 5 -	24 10	35 7	29 5	20 9	26 11	17 9	18 0	20 7	18 11
" 12 -	24 8	33 8	29 8	22 6	27 5	19 0	17 9	20 9	17 4
" 19 -	24 7	32 7	30 4	26 11	24 4	19 2	17 4	19 11	17 2
" 26 -	24 7	30 7	31 8	26 5	27 6	22 5	17 1	19 3	17 1
Sept. 2 -	25 0	28 1	33 7	25 10	27 8	25 11	16 7	18 11	17 0
" 9 -	25 5	26 10	33 1	26 5	27 9	27 4	16 6	17 10	17 3
" 16 -	25 4	25 7	33 10	27 1	26 10	28 11	16 2	16 10	17 0
" 23 -	25 4	25 5	33 11	27 4	26 9	29 7	16 1	17 1	16 8
" 30 -	25 6	25 9	33 4	26 11	27 0	29 10	16 5	16 7	16 4
Oct. 7 -	26 0	26 6	32 1	28 0	27 5	28 9	16 5	16 7	16 0
" 14 -	27 3	26 6	31 10	27 9	27 11	28 3	16 5	16 6	16 1
" 21 -	28 2	26 8	32 2	27 6	28 1	27 5	16 10	16 6	16 2
" 28 -	28 1	27 4	32 10	27 4	28 8	27 5	16 3	16 8	16 0
Nov. 4 -	27 2	28 4	33 5	27 2	28 6	26 10	16 7	17 2	16 5
" 11 -	26 7	28 4	34 0	26 9	28 7	26 3	16 5	17 5	16 3
" 18 -	26 1	28 1	33 11	26 4	28 5	26 2	16 7	17 2	16 5
" 25 -	25 8	27 9	33 8	26 2	28 4	25 9	16 6	17 1	16 8
Dec. 2 -	25 7	27 7	33 9	25 10	28 6	25 10	16 6	17 1	16 9
" 9 -	25 7	27 6	33 9	25 10	28 6	26 0	16 5	17 3	16 6
" 16 -	25 4	27 2	34 1	25 7	28 5	26 4	16 1	17 0	17 0
" 23 -		26 9	34 4		28 6	26 11		17 0	17 0
" 30 -		26 11	34 6		28 4	27 3		17 0	17 1

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in BELGIUM in the under-mentioned Months of 1899.

Month.	Wheat.	Barley.	Oats.
1899.	<i>s.</i> <i>d.</i>	<i>s.</i> <i>d.</i>	<i>s.</i> <i>d.</i>
August - - - -	28 5	23 0	19 11
September - - -	27 11	23 10	18 3
October - - - -	28 7	23 9	18 6

The above prices have been compiled from the official monthly averages published in the *Moniteur Belge*.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in FRANCE, and ENGLAND and WALES in the under-mentioned Months of 1899.

MONTH.	FRANCE.	ENGLAND.
WHEAT.		
1899.	Per Qr. <i>s.</i> <i>d.</i>	Per Qr. <i>s.</i> <i>d.</i>
September - - - -	34 0	25 3
October - - - -	32 5	27 4
November - - - -	31 9	26 4
BARLEY.		
1899.	Per Qr. <i>s.</i> <i>d.</i>	Per Qr. <i>s.</i> <i>d.</i>
September - - - -	23 1	26 8
October - - - -	23 4	27 7
November - - - -	23 3	26 7
OATS.		
1899.	Per Qr. <i>s.</i> <i>d.</i>	Per Qr. <i>s.</i> <i>d.</i>
September - - - -	18 10	16 4
October - - - -	18 8	16 5
November - - - -	18 8	16 6

Note.—The prices of French grain have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*. The prices of British grain are official averages based on the weekly returns furnished under the Corn Returns Act, 1882.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per
IMPERIAL QUARTER at the under-mentioned Markets in
the under-mentioned Months of 1899.

Month.	London.	Paris.	Breslau.
WHEAT.			
1899.	Per Qr.	Per Qr.	Per Qr.
	s. d.	s. d.	s. d. s. a.
September - - -	26 6	34 0	30 3 to 33 11
October - - -	28 8	32 9	30 6 „ 34 3
November - - -	26 9	31 10	29 8 „ 33 5
BARLEY.			
1899.	Per Qr.	Per Qr.	Per Qr.
	s. d.	s. d.	s. d. s. d.
September - - -	29 9	24 4	23 5 to 26 11
October - - -	30 6	25 1	23 8 „ 27 3
November - - -	28 0	25	23 3 „ 26 11
OATS.			
1899.	Per Qr.	Per Qr.	Per Qr.
	s. d.	s. d.	s. d. s. d.
September - - -	17 3	19 9	17 4 to 18 4
October - - -	17 4	19 7	17 3 „ 18 2
November - - -	17 4	19 4	16 11 „ 17 9

Note.—The London quotation represents the price of British corn as returned under the Corn Returns Act, 1882; the price of grain in Paris is the official average price of French grain in that city; the quotations shown for Breslau represent the prices of grain of good merchantable quality.

PRICES OF WOOL.

PRICES OF ENGLISH WOOL, per pack of 240 lbs., in the
under-mentioned Months of 1899.

(Compiled from the Economist.)

DESCRIPTION.	September, 1899.	October, 1899.	November, 1899.
South Down - - -	£ s. £ s. 7 16 to 11 12	£ s. £ s. 8 0 to 12 0	£ s. £ s. 8 5 to 12 15
Half-breds - - -	6 16 „ 8 0	7 0 „ 8 0	7 5 „ 8 15
Leicester - - -	6 10 „ 7 10	6 10 „ 7 10	6 18 „ 8 0
Kent Fleeces - - -	6 0 „ 7 0	6 0 „ 7 0	6 8 „ 7 15

MEAN WHOLESALE PRICES of BUTTER, MARGARINE, and
CHEESE in the under-mentioned Months of 1899.

(Compiled from the Grocer.)

DESCRIPTION.	September, 1899.			October, 1899.			November, 1899		
	Per Cwt.			Per Cwt.			Per Cwt.		
	s.	d.	s. d.	s.	d.	s. a.	s.	d.	s. d.
BUTTER :									
Cork, 1sts - -	100	6	—	104	0	—	96	0	—
„ 2nds - -	96	6	—	99	0	—	92	0	—
„ 3rds - -	86	0	—	88	0	—	87	0	—
„ 4ths - -	75	0	—	76	0	—	76	0	—
Friesland -	107	0 to 109	0	109	0 to 111	6	102	6 to 105	6
Dutch Factories -	111	0,, 114	0	111	0,, 114	0	105	0,, 107	0
French Baskets -	108	6,, 123	0	110	6,, 120	0	110	0,, 116	0
Crocks and Firkins -	101	0,, 106	6	101	6,, 108	6	100	0,, 108	0
„ 2nds and 3rds	93	6,, 98	0	95	6,, 99	6	92	0,, 98	0
Danish and Swedish -	127	0,, 130	6	124	0,, 128	0	116	6,, 115	6
Finnish - -	101	6,, 115	0	100	0,, 116	0	94	0,, 102	6
Russian - -	87	6,, 101	0	87	6,, 101	0	86	6,, 97	6
Canadian and States -	79	0,, 110	6	71	6,, 112	0	70	0,, 103	0
Colonial, fine- -	112	6,, 118	6	110	0,, 116	0	95	6,, 105	0
„ good and inferior -	84	0,, 105	0	86	0,, 105	6	80	6,, 91	6
Fresh Rolls (Foreign) per doz. - -	12	0,, 15	6	11	9,, 15	0	10	6,, 14	9
MARGARINE :									
Margarine - -	33	0,, 57	0	37	0,, 61	0	38	0,, 60	0
Mixtures - -	61	0,, 82	6	63	0,, 85	0	64	0,, 86	0
CHEESE :									
Cheddar - -	49	6,, 75	0	58	0,, 79	6	61	0,, 80	0
Somerset - -	63	6,, 66	6	66	0,, 69	0	68	0,, 72	0
Cheshire - -	71	0,, 79	0	76	0,, 80	0	73	0,, 79	0
Wiltshire - -	60	6,, 64	0	63	6,, 65	0	65	0,, 67	0
Double Gloucester -	58	6,, 62	0	61	6,, 65	6	65	0,, 69	0
Derby - -	63	0,, 64	0	58	0,, 62	0	64	0	—

WEEKLY PRICES (WHOLESALE) of VEGETABLES and FRUIT
at COVENT GARDEN MARKET.(Compiled from the *Gardeners' Chronicle*.)

	Week ending									
	November 2,		November 9.		November 16.		November 23.		November 30.	
VEGETABLES.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Artichokes, Globe, per doz.	3 0 to 4 0	4 6	4 6	—	4 0	—	3 0	—	3 0	—
Do., Jerusalem, per sieve	2 0 „ 2 6	2 0 to 2 6	2 0 „ 2 6	—	2 0	—	2 0	—	1 6 to 2 0	—
Asparagus, Sprue, per bundle	0 8 „ 0 9	0 8 „ 0 9	0 8 „ 0 9	—	0 8	—	0 6	—	0 6	—
Do., Paris, Green, per bundle	—	—	5 0 „ 5 6	—	5 0	—	5 0	—	5 0	—
Beans, Channel Islands, Dwarf, per lb	0 6 „ 0 8	0 6 „ 0 8	0 6 „ 0 8	—	0 6 to 0 10	0 6 to 0 10	0 6 to 0 10	0 10 „ 1 0	0 6 „ 0 5	—
Do., French, per lb. pkct.	—	0 4 „ 0 5	0 4 „ 0 5	—	0 4 „ 0 5	0 4 „ 0 5	0 4 „ 0 5	0 4 „ 0 5	0 4 „ 0 5	—
Beetroots, new, per doz.	0 6 „ 0 9	0 6 „ 0 9	0 6 „ 0 9	—	0 6 „ 0 9	0 6 „ 0 9	0 6 „ 0 9	0 6 „ 0 9	0 6 „ 0 9	—
Do., in bushels	1 6	1 6	1 6	—	1 6	—	1 6	—	1 6	—
Brussels Sprouts, per sieve	1 6 „ 2 6	1 0 „ 1 6	1 0 „ 1 6	—	1 0 „ 1 6	1 0 „ 1 3	1 0 „ 1 3	0 9 „ 1 3	0 9 „ 1 3	—
Ditto, per bushel	3 0 „ 4 0	2 0 „ 3 0	2 0 „ 3 0	—	2 0 „ 2 4	2 0	2 0	1 6 „ 2 0	1 6 „ 2 0	—
Cabbages, per tally	5 0 „ 7 0	4 0 „ 6 0	4 0 „ 6 0	—	4 0 „ 6 0	3 0 „ 4 0	3 0 „ 4 0	3 0 „ 3 6	3 0 „ 3 6	—
Do., per doz.	1 0 „ 4 6	1 0 „ 1 6	1 0 „ 1 6	—	1 0 „ 1 6	1 0 „ 1 6	1 0 „ 1 6	1 0 „ 1 6	1 0 „ 1 6	—
Do., Savoys, per tally	5 0 „ 8 0	5 0 „ 8 0	5 0 „ 8 0	—	5 0 „ 8 0	4 0 „ 7 0	4 0 „ 7 0	4 0 „ 7 0	4 0 „ 7 0	—
Carrots, English, per doz. bunches	2 0 „ 2 6	2 0 „ 2 6	2 0 „ 2 6	—	2 0	—	2 0	—	2 0	—
Do., good, per cwt. bags, washed	3 0 „ 3 6	3 0	—	—	2 6 „ 3 6	2 6 „ 3 6	2 6 „ 3 6	2 6 „ 3 6	2 6 „ 3 6	—
Cauliflowers, per doz.	1 0 „ 2 0	1 0 „ 2 0	1 0 „ 2 0	—	1 0 „ 2 0	1 0 „ 2 0	1 0 „ 2 0	1 0 „ 2 0	1 0 „ 2 0	—
Do., per tally	4 0 „ 8 0	4 0 „ 5 0	4 0 „ 5 0	—	3 6 „ 7 6	3 6 „ 7 6	3 6 „ 7 6	3 6 „ 8 0	3 6 „ 8 0	—
Celery, red, per roll	0 10 „ 1 2	0 10 „ 1 2	0 10 „ 1 2	—	0 10 „ 1 4	0 10 „ 1 4	0 10 „ 1 4	0 10 „ 1 4	0 10 „ 1 4	—
Do., white, per roll	0 9	0 8	—	—	0 8 „ 0 10	0 8 „ 0 10	0 8 „ 0 10	0 8 „ 0 10	0 8 „ 0 10	—
Colewort, per bushel	1 0 „ 1 3	0 9 „ 1 0	0 9 „ 1 0	—	0 9 „ 1 0	0 9 „ 1 0	0 9 „ 1 0	0 9 „ 1 0	0 9 „ 1 0	—
Cress, per doz. punnets	1 6	1 6	—	—	1 6	—	1 6	—	1 6	—
Cucumbers, per doz.	1 6 „ 2 6	2 0 „ 3 6	3 6 „ 4 0	—	3 0 „ 4 6	3 0 „ 4 6	3 0 „ 4 6	3 0 „ 6 0	3 0 „ 6 0	—
Endive, new French, per doz.	1 0	—	2 0	—	1 3	—	1 6	—	1 6	—
Do., English, per score	1 6	—	1 6	—	1 6	—	1 6	—	1 3 „ 1 6	—
Do., Batavian, per doz.	1 6	—	1 9	—	1 6	—	1 6	—	1 6	—
Garlic, new, per lb.	0 2	—	0 2	—	0 2	—	0 2	—	0 2	—
Horseradish, English, per bundle	2 0 „ 2 6	2 0 „ 2 6	2 0 „ 2 6	—	2 0 „ 2 6	2 0 „ 2 6	2 0 „ 2 6	1 6 „ 2 0	1 6 „ 2 0	—
Leeks, per doz. bunches	1 6 „ 2 0	1 6	—	—	1 6	—	1 6	—	1 6	—
Lettuce, French, cabbage, per doz.	0 8 „ 1 0	1 0 „ 1 4	0 8	—	1 6	—	0 8 „ 1 0	—	0 8 „ 1 0	—
Do., Cos, per doz.	2 0 „ 3 0	3 0 „ 3 6	3 0	—	—	—	—	—	—	—
Mint, per dozen bunches	2 0	—	—	—	2 0	—	6 0	—	6 0	—
Mushrooms, House, per lb.	0 8 „ 0 10	1 3	—	—	1 3	—	1 3	—	1 3	—
Do., Outdoor, per lb.	0 2 „ 0 3	0 6 „ 0 8	0 8 „ 0 10	—	4 6 „ 5 0	4 6 „ 5 0	4 6 „ 5 0	4 6 „ 5 0	4 6 „ 5 0	—
Onions, bags	4 0 „ 4 6	2 6	—	—	2 6 „ 3 0	2 6 „ 3 0	2 6 „ 3 0	2 6 „ 3 0	2 6 „ 3 0	—
Do., picklers, in bags	5 6 „ 6 0	5 6	—	—	5 0 „ 5 6	5 0 „ 5 6	5 0 „ 5 6	5 0 „ 5 6	5 0 „ 5 6	—
Do., Valencia, cases	1 0 „ 2 0	2 6	—	—	1 0	—	1 0	—	1 0 „ 1 6	—
Parsley, per doz. bunches	0 9 „ 1 0	2 0	—	—	1 0	—	1 0	—	0 9 „ 1 0	—
Do., per sieve	0 9 „ 1 0	2 0	—	—	0 6 „ 0 9	0 6 „ 0 9	0 6 „ 0 9	0 6 „ 0 9	0 6 „ 0 9	—
Parsnips, per doz.	0 6 „ 0 9	0 6 „ 0 9	0 6 „ 0 9	—	0 6 „ 0 9	0 6 „ 0 9	0 6 „ 0 9	0 6 „ 0 9	0 6 „ 0 9	—
Do., per bag	3 6 „ 4 0	3 6	—	—	3 6	—	3 6	—	3 0	—
Potatoes, Hebrons, Snow-drops, etc., per ton	60 0 „ 90 0	60 0 „ 90 0	60 0 „ 90 0	—	60 0 „ 90 0	60 0 „ 90 0	60 0 „ 90 0	60 0 „ 90 0	60 0 „ 90 0	—
Radishes, Round, break-fast, per doz. bunches	1 6	—	1 6	—	1 6	—	1 6	—	1 6	—
Salad, Small, per doz. punnets	1 3	—	1 3	—	1 3	—	1 3	—	1 3	—
Spinach, per sieve	2 0	—	1 6 „ 2 0	—	1 3	—	—	—	—	—
Do., Winter, per bushel	—	3 0	—	—	2 6	—	2 6	—	2 6	—
Tomatoes, English, per lb.	0 2 „ 0 4	0 3 „ 0 4	0 5	—	0 4	—	0 4	—	0 5	—
Do., Channel Islands, per lb.	0 2 „ 0 2 1/2	0 3	—	—	0 3 „ 0 4	0 3 „ 0 3 1/2	0 2 „ 0 3 1/2	0 2 „ 0 3 1/2	0 2 „ 0 3 1/2	—
Turnips, per doz. bunches	2 0 „ 2 6	2 0 „ 2 6	2 0	—	2 0	—	2 0	—	1 6 „ 2 0	—
Do., per cwt. bag	2 6 „ 3 0	1 9 „ 2 0	1 9 „ 2 6	—	1 9 „ 2 6	1 9 „ 2 6	1 9 „ 2 6	1 9 „ 2 6	1 9 „ 2 6	—
Watercress, per doz. bunches	0 4 „ 0 6	0 4 „ 0 6	0 4 „ 0 6	—	0 4 „ 0 6	0 4 „ 0 6	0 4 „ 0 6	0 4 „ 0 6	0 4 „ 0 6	—
FRUIT.										
Apples, Kings, per bushel	4 0 „ 7 0	4 0 „ 7 0	4 0 „ 6 0	—	4 0 „ 6 0	4 0 „ 6 0	4 0 „ 6 0	3 0 „ 5 0	3 0 „ 5 0	—
Do., Ribstons, per bushel	6 0 „ 11 0	5 0 „ 10 0	4 0 „ 8 0	—	4 0 „ 8 0	4 0 „ 8 0	4 0 „ 8 0	4 0 „ 6 0	4 0 „ 6 0	—
Do., Blenheim's, per bushel	4 0 „ 7 0	4 0 „ 7 0	4 0 „ 6 0	—	4 0 „ 6 0	4 0 „ 6 0	4 0 „ 6 0	4 0 „ 6 0	4 0 „ 6 0	—
Do., Nova Scotia, various, per barrel	12 0 „ 18 0	12 0 „ 18 0	12 0 „ 17 0	—	12 0 „ 17 0	12 0 „ 17 0	12 0 „ 17 0	12 0 „ 17 0	12 0 „ 17 0	—
Do., Cox's Orange Pippins, per bushel	8 0 „ 14 0	8 0 „ 14 0	8 0 „ 16 0	—	8 0 „ 16 0	8 0 „ 16 0	8 0 „ 16 0	8 0 „ 14 0	8 0 „ 14 0	—
Do., Wellingtons, per bushel	4 0 „ 7 0	4 0 „ 7 0	4 0 „ 7 0	—	4 0 „ 7 0	4 0 „ 7 0	4 0 „ 7 0	4 0 „ 7 0	4 0 „ 7 0	—
Various Cooking, per bushel	1 6 „ 3 0	1 6 „ 2 0	1 0 „ 2 6	—	1 0 „ 2 6	1 0 „ 2 6	1 0 „ 2 6	1 0 „ 3 6	1 0 „ 3 6	—
Chestnuts, per bag	3 6 „ 4 0	3 0 „ 3 6	6 6 „ 12 6	—	7 6	—	7 6	—	7 6 „ 12 0	—
Cobnuts, per lb.	c 6 „ 0 6 1/2	0 6 1/2 „ 0 7	0 6 „ 0 7	—	0 6 „ 0 7	0 6 „ 0 7	0 6 „ 0 7	0 7	—	—
Cranberries, per case	11 0	11 0	—	—	11 0	—	11 0	—	11 0	—

DISEASES OF ANIMALS IN GREAT BRITAIN.
 NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of
Swine-Fever, with the Number of CATTLE and SWINE
 Slaughtered by order of the Board of Agriculture, in
 GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED.	Pleuro-Pneumonia.			Swine-Fever.	
	OUTBREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUTBREAKS Confirmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>
June, 1898 -	—	—	—	879	15,352
September, 1898 -	—	—	—	550	8,017
December, 1898 -	—	—	—	507	8,921
March, 1899 -	—	—	—	594	8,077
June, 1899 -	—	—	—	917	10,799
September, 1899 -	—	—	—	453	6,645

NUMBER of OUTBREAKS reported as having taken place, and
 Number of ANIMALS returned as having been ATTACKED
 by **Anthrax** and **Glanders** in GREAT BRITAIN in each
 of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).	
	OUTBREAKS Reported.	ANIMALS Attacked.	OUTBREAKS Reported.	ANIMALS Attacked.
	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>
June, 1898 -	169	254	195	337
September, 1898 -	92	134	188	361
December, 1898 -	139	223	168	306
March, 1899 -	135	247	176	328
June, 1899 -	153	315	177	266
September, 1899 -	113	222	261	526

NUMBER OF CASES of **Rabies** in DOGS in GREAT BRITAIN
 during each of the under-mentioned periods.

THREE MONTHS ENDED	Number of Cases.
30th June, 1898 -	6
30th September, 1898 -	1
31st December, 1898 -	2
31st March, 1899 -	1
30th June, 1899 -	—
30th September, 1899 -	6

DISEASES OF ANIMALS IN IRELAND.

NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Lord Lieutenant and Privy Council in IRELAND, in each of the under-mentioned periods.

QUARTER ENDED	Pleuro-Pneumonia.			Swine-Fever.	
	OUT- BREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUT- BREAKS Con- firmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	No.	No.	No.	No.
June, 1898 - -	—	—	—	97	1,225
September, 1898 - -	—	—	—	105	1,269
December, 1898 - -	—	—	—	42	496
March, 1899 - -	—	—	—	80	1,356
June, 1899 - -	—	—	—	95	1,541
September, 1899 - -	—	—	—	119	2,463

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax**, **Glanders**, and **Rabies** in Ireland in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).		Rabies.	
	OUT- BREAKS REPORTED.	ANIMALS ATTACKED.	OUT- BREAKS REPORTED.	ANIMALS ATTACKED.	CASES REPORTED.	
					DOGS.	OTHER ANIMALS.
	No.	No.	No.	No.	No.	No.
June, 1898 -	—	—	1	1	28	11
Sept., 1898 -	1	3	2	4	31	12
Dec., 1898 -	—	—	3	3	30	5
March, 1899 -	1	1	—	—	20	5
June, 1899 -	—	—	4	6	22	3
September, 1899 -	1	3	2	4	30	5

PRODUCE OF HOPS.

PRELIMINARY STATEMENT showing the ESTIMATED TOTAL PRODUCTION of HOPS in the years 1899 and 1898, with the ACREAGE and ESTIMATED AVERAGE YIELD per STATUTE ACRE in each COUNTY of ENGLAND in which Hops are grown.

COUNTIES.	Estimated Total Produce.		Acreage.		Estimated Average Yield per Acre.	
	1899.	1898.	1899.	1898.	1899.	1898.
	<i>Cwts.</i>	<i>Cwts.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Cwts.</i>	<i>Cwts.</i>
GLOUCESTER	672	210	42	40	16'00	5'25
HANTS	30,580	11,256	2,319	2,263	13'19	4'97
HEREFORD	83,950	45,346	7,227	6,651	11'62	6'82
KENT	418,997	229,842	31,988	30,941	13'10	7'43
MONMOUTH	—	9	—	2	—	4'50
SALOP	966	819	138	126	7'00	6'50
SUFFOLK	34	18	4	3	8'50	6'00
SURREY	15,213	6,142	1,388	1,313	10'96	4'68
SUSSEX	73,807	34,299	4,949	4,829	14'91	7'10
WORCESTER	37,207	28,657	3,788	3,567	9'82	8'03
Total	661,426	356,598	51,843	49,735	12'76	7'17

ORDNANCE SURVEY MAPS OF GREAT BRITAIN AND IRELAND.

The Ordnance Survey are issuing a new series of folding pocket maps for England and Wales on the scale of one inch to the mile. The maps are printed in colours on sheets 18 by 12 inches, mounted on canvas, in a cover or flat, price 1s. each. The one-inch-scale map can also be procured at the same price in black and white, showing outline and contours; or in outline, with hills printed either in black or brown: the outline map has recently been revised. These maps are not only useful for general topographical purposes, but should also prove serviceable to cyclists and pedestrians, since they show all roads, indicating their character and whether metalled or not, footpaths, hills, rivers, towns, villages, railway stations, and local boundaries.

There are agents for the sale of Ordnance Survey Maps in most of the chief towns, and maps can be ordered, and indexes, etc., seen at many Head Post Offices, in places where there are no agents. They can also be ordered, through any bookseller or railway bookstall, from the Director-General, Ordnance Survey Office, Southampton; or in the case of Ireland, from the Officer in Charge, Ordnance Survey, Dublin.

THE LABOUR GAZETTE.

The "Labour Gazette," the Journal of the Labour Department of the Board of Trade, contains an article each month on the state of employment among agricultural labourers in the various parts of the United Kingdom. Special articles also appear therein from time to time on the rates of wages paid to agricultural labourers, the Hiring Fairs in Great Britain, and on migratory Irish agricultural labourers. The "Labour Gazette" is issued on the 15th of each month, and may be obtained direct from the Publishers, Messrs. Horace Marshall & Son, Temple House, Temple Avenue, London, E.C., at the rate of 2s. per annum, post free. Copies may also be ordered through any newsagent, price 1d. each.

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IMMEDIATE PENSIONS. Annuities to begin at once, of any amount from £1 to £100 a year, can be bought through the Post Office Savings Bank. The Purchase Money is payable in a lump sum which is not returnable, and the Pensions are payable half-yearly.

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PROCEDURE. A simple form of Proposal, and a form for statement of age, can be obtained at any Post Office Savings Bank. When filled up the forms will be forwarded by the local Postmaster to the Chief Office, London, and a Contract will be issued when the first premium has been paid. Annuity Premiums are payable in the same way as Insurance Premiums, namely, by transfers from Savings Bank accounts.

OLD AGE PENSIONS.—DEFERRED LIFE ANNUITIES.

The Annuity Tables below give the cost of an Annuity of £1, and an Annuity of a larger amount costs a larger sum in exact proportion. For instance, a Pension of £10 a year would cost ten times the amount given below. In this class of Annuities the Purchase Money will be returned on application, or on the death of the nominee, if an instalment of the Annuity shall not have become due. These Pensions can be Deferred any number of years from 10 to 50, and any cost not given below will be furnished on application to the Controller, Post Office Savings Bank, London.

Purchase Money Returnable Scale.

Age at time of Purchase.	Cost of an Annuity of £1 payable after the expiration of 10 YEARS.				Cost of an Annuity of £1 payable after the expiration of 20 YEARS.			
	Males.		Females.		Males.		Females.	
	In 11 Yearly Sums of	In one Sum at time of Purchase.	In 11 Yearly Sums of	In one Sum at time of Purchase.	In 21 Yearly Sums of	In one Sum at time of Purchase.	In 21 Yearly Sums of	In one Sum at time of Purchase.
21 and under 22	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
22 " 23	1 12 5	15 15 9	1 15 10	17 9 0	0 13 0	10 15 1	0 14 6	11 19 3
23 " 24	1 12 0	15 11 10	1 15 5	17 5 1	0 12 10	10 11 8	0 14 3	11 15 6
24 " 25	1 11 7	15 7 11	1 15 0	17 1 1	0 12 7	10 8 4	0 14 0	11 11 9
25 " 26	1 11 3	15 4 0	1 14 7	16 17 0	0 12 5	10 4 10	0 13 9	11 7 10
26 " 27	1 10 10	15 0 0	1 14 2	16 12 11	0 12 2	10 1 4	0 13 6	11 3 10
27 " 28	1 10 5	14 16 0	1 13 9	16 8 8	0 12 0	9 17 10	0 13 3	10 19 9
28 " 29	1 10 0	14 11 11	1 13 4	16 4 4	0 11 9	9 14 3	0 13 0	10 15 6
29 " 30	1 9 7	14 7 10	1 12 10	16 0 0	0 11 6	9 10 7	0 12 9	10 11 3
30 " 31	1 9 2	14 3 9	1 12 5	15 15 6	0 11 4	9 6 10	0 12 6	10 6 10
31 " 32	1 8 8	13 19 6	1 11 11	15 10 11	0 11 1	9 3 1	0 12 3	10 2 6
32 " 33	1 8 3	13 15 3	1 11 5	15 6 3	0 10 10	8 19 2	0 12 0	9 18 1
33 " 34	1 7 10	13 11 0	1 10 11	15 1 6	0 10 7	8 15 2	0 11 9	9 13 8
34 " 35	1 7 5	13 6 8	1 10 5	14 16 7	0 10 4	8 11 2	0 11 5	9 9 2
35 " 36	1 6 11	13 2 3	1 9 11	14 11 7	0 10 1	8 7 0	0 11 2	9 4 6
36 " 37	1 6 6	12 17 9	1 9 5	14 6 6	0 9 10	8 2 10	0 10 11	8 19 11
37 " 38	1 6 0	12 13 3	1 8 11	14 1 3	0 9 7	7 18 6	0 10 7	8 15 2
38 " 39	1 5 6	12 8 7	1 8 4	13 15 10	0 9 4	7 14 1	0 10 4	8 10 4
39 " 40	1 5 1	12 3 11	1 7 9	13 10 4	0 9 1	7 9 6	0 10 0	8 5 5
40 " 41	1 4 7	11 19 2	1 7 2	13 4 10	0 8 9	7 4 10	0 9 9	8 0 7
41 " 42	1 4 1	11 14 4	1 6 7	12 19 2	0 8 6	7 0 2	0 9 5	7 15 8
42 " 43	1 3 7	11 9 4	1 6 0	12 13 7	0 8 3	6 15 7	0 9 2	7 10 9
43 " 44	1 3 0	11 4 3	1 5 6	12 7 11	0 7 11	6 11 2	0 8 10	7 5 10
44 " 45	1 2 6	10 19 1	1 4 10	12 2 1	0 7 8	6 6 9	0 8 6	7 1 0
45 " 46	1 2 0	10 13 9	1 4 3	11 16 3	0 7 5	6 2 4	0 8 3	6 16 0
46 " 47	1 1 5	10 8 4	1 3 8	11 10 3	0 7 2	5 18 0	0 7 11	6 11 0

Purchase Money not Returnable Scale.

Age at time of Purchase.	Cost of an Annuity of £1 payable after the expiration of 10 YEARS.				Cost of an Annuity of £1 payable after the expiration of 20 YEARS.			
	Males.		Females.		Males.		Females.	
	In 11 Yearly Sums of	In one Sum at time of Purchase.	In 11 Yearly Sums of	In one Sum at time of Purchase.	In 21 Yearly Sums of	In one Sum at time of Purchase.	In 21 Yearly Sums of	In one Sum at time of Purchase.
21 and under 22	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
22 " 23	1 10 3	14 2 4	1 14 0	16 1 5	0 11 0	8 5 11	0 12 11	9 19 2
23 " 24	1 9 10	13 18 1	1 13 7	15 17 3	0 10 10	8 2 2	0 12 8	9 15 4
24 " 25	1 9 5	13 13 8	1 13 2	15 13 1	0 10 7	7 18 5	0 12 5	9 11 5
25 " 26	1 8 11	13 9 4	1 12 9	15 8 10	0 10 4	7 14 7	0 12 2	9 7 6
26 " 27	1 8 6	13 4 10	1 12 4	15 4 6	0 10 2	7 10 9	0 11 11	9 3 6
27 " 28	1 8 1	13 0 5	1 11 10	15 0 1	0 9 11	7 6 11	0 11 8	8 19 5
28 " 29	1 7 8	12 15 11	1 11 5	14 15 7	0 9 8	7 3 1	0 11 5	8 15 3
29 " 30	1 7 2	12 11 5	1 10 11	14 11 1	0 9 5	6 19 2	0 11 2	8 11 0
30 " 31	1 6 9	12 6 10	1 10 6	14 6 5	0 9 3	6 15 4	0 10 11	8 6 9
31 " 32	1 6 3	12 2 3	1 10 0	14 1 9	0 9 0	6 11 4	0 10 8	8 2 5
32 " 33	1 5 10	11 17 8	1 9 6	13 16 11	0 8 9	6 7 5	0 10 5	7 17 11
33 " 34	1 5 4	11 13 0	1 9 0	13 12 1	0 8 6	6 3 6	0 10 1	7 13 5
34 " 35	1 4 11	11 8 3	1 8 6	13 7 2	0 8 3	5 19 6	0 9 10	7 8 10
35 " 36	1 4 5	11 3 6	1 8 0	13 2 1	0 8 0	5 15 6	0 9 6	7 4 2
36 " 37	1 3 11	10 18 9	1 7 6	12 16 11	0 7 9	5 11 5	0 9 3	6 19 5
37 " 38	1 3 5	10 13 11	1 6 11	12 11 8	0 7 6	5 7 5	0 8 11	6 14 8
38 " 39	1 3 0	10 9 1	1 6 5	12 6 4	0 7 3	5 3 4	0 8 8	6 9 10
39 " 40	1 2 6	10 4 2	1 5 10	12 0 10	0 7 0	4 19 2	0 8 4	6 4 11
40 " 41	1 2 0	9 19 2	1 5 3	11 15 3	0 6 9	4 15 1	0 8 0	6 0 0
41 " 42	1 1 6	9 14 2	1 4 8	11 9 7	0 6 6	4 10 10	0 7 9	5 14 11
42 " 43	1 0 11	9 9 1	1 4 1	11 3 9	0 6 2	4 6 8	0 7 5	5 9 10
43 " 44	1 0 5	9 4 0	1 3 5	10 17 9	0 5 11	4 2 5	0 7 1	5 4 9
44 " 45	0 19 11	8 18 10	1 2 10	10 11 9	0 5 8	3 18 1	0 6 9	4 19 7
45 " 46	0 19 4	8 13 7	1 2 2	10 5 6	0 5 4	3 13 9	0 6 5	4 14 4
46 " 47	0 18 10	8 8 3	1 1 6	9 19 3	0 5 1	3 9 5	0 6 1	4 9 1

OLD AGE PENSIONS.—IMMEDIATE LIFE ANNUITIES.

This Table shows the cost of an Immediate Life Annuity of £1, and an Annuity of a larger amount costs a larger sum in exact proportion. For instance, a Pension of £10 a year would cost ten times the amount given below.

AGE			Males.	Females.	AGE			Males.	Females.
at time of Purchase.			Cost of an Immediate Annuity of £1.	Cost of an Immediate Annuity of £1.	at time of Purchase.			Cost of an Immediate Annuity of £1.	Cost of an Immediate Annuity of £1.
			£ s. d.	£ s. d.				£ s. d.	£ s. d.
5 and under	6		25 19 0	27 12 6	44 and under	45		16 15 8	18 13 3
6	7		25 15 1	27 9 1	45	46		16 9 11	18 6 9
7	8		25 11 1	27 5 8					
8	9		25 7 0	27 2 2	46	47		16 4 2	18 0 0
9	10		25 2 11	26 18 8	47	48		15 18 3	17 13 2
10	11		24 18 10	26 15 1	48	49		15 12 3	17 6 1
					49	50		15 6 1	16 18 11
11	12		24 14 9	26 11 6	50	51		14 19 11	16 11 9
12	13		24 10 6	26 7 10					
13	14		24 6 4	26 4 1	51	52		14 13 6	16 4 7
14	15		24 2 1	26 0 4	52	53		14 7 1	15 17 4
15	16		23 17 10	25 16 6	53	54		14 0 5	15 9 11
					54	55		13 13 8	15 2 4
16	17		23 13 6	25 12 7	55	56		13 6 9	14 14 9
17	18		23 9 1	25 8 8					
18	19		23 4 9	25 4 8	56	57		12 19 8	14 6 11
19	20		23 0 4	25 0 8	57	58		12 12 5	13 19 0
20	21		22 15 10	24 16 6	58	59		12 4 11	13 11 1
					59	60		11 17 4	13 3 1
21	22		22 11 4	24 12 4	60	61		11 9 8	12 15 1
22	23		22 6 9	24 8 1					
23	24		22 2 3	24 3 10	61	62		11 2 2	12 7 0
24	25		21 17 7	23 19 5	62	63		10 14 11	11 19 0
25	26		21 12 11	23 15 0	63	64		10 7 8	11 11 0
					64	65		10 0 6	11 2 11
26	27		21 8 3	23 10 6	65	66		9 13 4	10 14 7
27	28		21 3 6	23 5 11					
28	29		20 18 9	23 1 3	66	67		9 6 4	10 6 4
29	30		20 13 11	22 16 6	67	68		8 19 7	9 18 1
30	31		20 9 1	22 11 8	68	69		8 12 10	9 9 10
					69	70		8 6 2	9 1 10
31	32		20 4 2	22 6 9	70	71		7 19 5	8 14 2
32	33		19 19 2	22 1 9					
33	34		19 14 2	21 16 7	71	72		7 12 10	8 6 10
34	35		19 9 2	21 11 5	72	73		7 6 4	7 19 10
35	36		19 4 1	21 6 2	73	74		7 0 1	7 13 0
					74	75		6 14 1	7 6 4
36	37		18 18 11	21 0 9	75	76		6 8 4	6 19 10
37	38		18 13 9	20 15 3					
38	39		18 8 6	20 9 7	76	77		6 2 8	6 13 7
39	40		18 3 2	20 3 11	77	78		5 17 4	6 7 5
40	41		17 17 10	19 18 0	78	79		5 12 3	6 1 6
					79	80		5 7 2	5 15 9
41	42		17 12 4	19 12 1	80 or any greater age.			5 2 4	5 10 3
42	43		17 6 10	19 5 11					
43	44		17 1 4	18 19 8					

LIST OF LEAFLETS ISSUED BY THE BOARD OF AGRICULTURE.

Number.	Title.
Leaflet No. 1	Mites on Currant and Nut Trees.
" " 2	Vine and Raspberry Weevils.
" " 3	The Turnip Fly or Flea.
" " 4	Caterpillars on Fruit Trees.
" " 5	The Mangel Wurzel Fly.
" " 6	The Field Vole.
" " 7	<i>Out of Print.</i>
" " 8	Farmers and Assessments to Local Rates.
" " 9	Ensilage.
" " 10	Wireworms.
" " 11	The Daddy Longlegs or Crane Fly.
" " 12	The Gooseberry Saw-Fly.
" " 13	Acorn Poisoning.
" " 14	The Raspberry Moth.
" " 15	The Apple Blossom Weevil.
" " 16	The Apple Sucker.
" " 17	<i>Out of Print.</i>
" " 18	Fertilisers and Feeding Stuffs Act.
" " 19	Pea and Bean Weevil.
" " 20	The Magpie Moth.
" " 21	The Warble Fly.
" " 22	The Diamond Back Moth.
" " 23	Potato Disease.
" " 24	The Ribbon Footed Corn-Fly.
" " 25	The Cockchafer.
" " 26	Farmers and the Income Tax.
" " 27	Remission of Tithe Rentcharge.
" " 28	Anthrax.
" " 29	Swine Fever.
" " 30	The Codlin Moth.
" " 31	The Onion Fly.
" " 32	Foul Brood or Bee Pest.
" " 33	Surface Caterpillars.
" " 34	The Woolly Aphis or American Blight.
" " 35	The Celery Fly.
" " 36	Cultivation of Osiers.
" " 37	Rabies.
" " 38	The Carrot Fly.
" " 39	Assessments to Land Tax.
" " 40	The Kestrel or Windhover.
" " 41	The Red Spider or Spinning Mite.
" " 42	The Short-eared Owl.
" " 43	Titmice.
" " 44	The Common Lapwing or Plover
" " 45	The Starling.
" " 46	The Stem Eelworm.
" " 47	The Asparagus Beetle.
" " 48	The Pea Thrips.
" " 49	The Fruit Tree Beetle.
" " 50	Water Wagtails or " Dishwashers.
" " 51	The White or Barn Owl.
" " 52	Gooseberry Blight.
" " 53	The Pear Midge.
" " 54	The Spotted Flycatcher.
" " 55	The Swallow.
" " 56	The Canker Fungus.
" " 57	External Parasites of Poultry.
" " 58	Internal Parasites of Poultry.
" " 59	Improvement of Land Act.
" " 60	The Wood Leopard Moth.
" " 61	Sheep Scab.

Copies of the above leaflets can be obtained free of charge and post free on application to the Secretary, Board of Agriculture, 4, Whitehall Place, London, S.W. Letters of application so addressed need not be stamped.



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The Journal

OF THE

BOARD OF AGRICULTURE

MARCH, 1900.

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THE JOURNAL

OF THE

BOARD OF AGRICULTURE.

Vol. VI. No. 4. MARCH, 1900.

THE BRITISH CROPS OF 1899.

In the December number of this Journal statements were published showing the estimated yield per acre and total produce of wheat, barley, and oats respectively, in Great Britain as a whole and in its main agricultural divisions. Further details now available for the other crops, in respect of which annual estimates of produce are collected, enable the following summaries of the general results of the year, and of the extent by which they exceeded or fell short of the decennial average, to be supplied in advance of the statistics which will appear in the complete volume of Agricultural Returns.

Crop.	Yield per Acre.	Above or Below Average.	Crop.	Yield per Acre.	Above or Below Average.
	<i>Bushels.</i>	<i>Bushels.</i>		<i>Tons.</i>	<i>Tons.</i>
Wheat - -	32'75	+ 2'89	Potatoes - -	5'62	- 0'33
Barley - -	34'16	+ 0'90	Turnips - -	9'23	- 4'20
Oats - -	38'77	- 0'09	Mangold - -	17'48	+ 0'09
			<i>Cwts.</i>	<i>Cwts.</i>	
Beans - -	30'09	+ 3'06	Hay fr. Clover, etc.	27'48	- 0'84
Peas - -	27'23	+ 1'19	Hay fr. Prmt. Grass	22'95	- 0'11
			Hops - - -	12'76	+ 4'77

This comparison shows that, relatively, by far the most abundant crop of the year was that of hops, and coming next in order were beans and wheat, while in peas, barley

and mangolds the yield somewhat exceeded the average, although in a much smaller degree. On the other hand, the yield of oats, potatoes, and hay was to some extent below the average. In no instance, however, was so serious a reduction exhibited as in the case of turnips.

Continuing for other crops the tables given in the last number of the Journal as regards wheat, barley, and oats, the past year's crop of beans, although considerably above the average, fell short of that of 1898 by a bushel per acre.

BEANS.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre.
	1899.	1898.	1899.	1898.	1889-98.
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
England - - -	7,005,000	6,692,000	29'90	30'83	26'74
Wales - - -	36,000	36,000	27'29	28'25	25'29
Scotland - - -	440,000	472,000	33'66	35'26	32'40
Great Britain -	7,481,000	7,200,000	30'09	31'07	27'03

The yield of peas also was slightly less in 1899 than in 1898, the deficiency on the year being very similar in all three divisions of Great Britain.

PEAS.	Estimated Total Produce.		Estimated Yield per Acre.		Average yield per Acre.
	1899.	1898.	1899.	1898.	1889-98.
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
England - - -	4,359,000	4,783,000	27'31	27'69	26'10
Wales - - -	35,000	34,000	21'22	21'87	19'60
Scotland - - -	27,000	32,000	24'04	25'47	24'85
Great Britain -	4,421,000	4,849,000	27'23	27'62	26'04

The yield of potatoes was one-third of a ton below the average in Great Britain, and two-thirds of a ton below the yield of the preceding year. Here, again, the results of

the season would seem to have been fairly uniform in England, Wales and Scotland, although, as usual, the actual crop produced differs considerably in different districts. In the agricultural sub-division comprising Norfolk, Lincoln, and the East Riding of Yorkshire the crop of last year was estimated at 6 $\frac{3}{4}$ tons per acre.

POTATOES.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre. 1889-98
	1899.	1898.	1899.	1898.	
	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
England - - -	2,254,000	2,256,000	5·81	6·17	6·05
Wales - - -	173,000	185,000	5·24	5·62	5·75
Scotland - - -	650,000	842,000	5·11	6·66	5·74
Great Britain -	3,077,000	3,283,000	5·62	6·26	5·95

The crop of turnips and swedes grown in 1899 appears to have been smaller than in any previous year on record. In 1898, it may be remembered, the crop was markedly deficient in England; but this was to some extent counter-balanced by an over-average production in Scotland. Last

TURNIPS AND SWEDES.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre. 1889-98.
	1899.	1898.	1899.	1898.	
	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
England - - -	9,574,000	13,083,000	7·95	10·58	12·69
Wales - - -	735,000	1,012,000	10·99	14·84	15·13
Scotland - - -	5,752,000	7,242,000	12·23	15·50	15·25
Great Britain - -	16,061,000	21,337,000	9·23	12·04	13·43

year, however, no such compensating area was to be found, the yield being universally bad or indifferent. For Great Britain, as a whole, the crop is returned below the ten years' average by more than 4 tons, the Scottish turnip crop being

three tons or 20 per cent. short, while in England the deficiency is estimated to have averaged nearly 5 tons per acre.

In the crop of mangold the yield was, in 1899, fractionally above the decennial average. As this crop is practically confined to England, the returns for Wales and Scotland have no material influence, but so far as they go they reduce the general result, the deficiency in Wales being considerable.

MANGOLDS.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre 1889-98.
	1899.	1898.	1899.	1898.	
	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
England - - -	6,378,000	6,064,000	17·56	17·68	17·42
Wales - - -	130,000	129,000	14·64	16·39	16·35
Scotland - - -	30,000	25,000	16·87	18·04	16·98
Great Britain -	6,538,000	6,218,000	17·48	17·65	17·39

After the very abundant hay crop of 1898 it was almost inevitable that the produce of 1899 should be by comparison small. The reduction is estimated at more than six cwts. per acre in the case of clover hay and the deficiency was slightly greater in the case of permanent grass. But such was the magnitude of the previous year's crop that in each case these considerable reductions only left the yield slightly below the ten years' average. It may be observed also that as this period of ten years embraced at each end of the decennium the two heaviest crops on record, viz., those of 1889 and 1898, it furnished a somewhat high standard of comparison. Putting both kinds of hay together the aggregate quantity grown in Great Britain last year is estimated, in round numbers, as 8 million tons, or over $2\frac{1}{2}$ million tons less than in 1898.

The produce of hay from clover and rotation grasses is shown separately in the following table, the deficiency being slightly greater in Scotland than in England, while in Wales

—with a small area devoted to this purpose—the yield was about $1\frac{1}{4}$ cwt. above the average.

Hay Cut from Clover and Rotation Grasses.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre. 1889-98.
	1899.	1898.	1899.	1898.	
	<i>Tons.</i>	<i>Tons.</i>	<i>Cwts.</i>	<i>Cwts.</i>	<i>Cwts.</i>
England - - -	2,208,000	3,034,000	27·22	34·09	28·15
Wales - - -	241,000	285,000	24·28	28·52	22·98
Scotland - - -	595,000	688,000	30·20	34·21	31·27
Great Britain -	3,044,000	4,007,000	27·48	33·65	28·32

The corresponding figures for hay from permanent grass are, in their general results, similar to those just referred to with the exception that in this case Scotland, and not Wales, makes a slightly over-average return.

Hay Cut from Permanent Grass.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre. 1889-98.
	1899.	1898.	1899.	1898.	
	<i>Tons.</i>	<i>Tons.</i>	<i>Cwts.</i>	<i>Cwts.</i>	<i>Cwts.</i>
England - - -	4,380,000	5,883,000	23·34	29·92	23·41
Wales - - -	414,000	549,000	18·09	23·12	18·32
Scotland - - -	185,000	200,000	29·03	30·89	28·47
Great Britain - -	4,979,000	6,632,000	22·95	29·24	23·06

MANURIAL EXPERIMENTS ON PASTURE LAND.

The following article deals with the results of two sets of experiments on pasture land, one being made on Burghfield Green Farm, Burghfield, Berks, and the other on the Home Farm, Herriard Park, near Basingstoke, Hampshire.

The land on which these experiments are being made at Burghfield Green is on the London clay. The surface soil is a clay loam about six inches deep, and lies on a very stiff subsoil; it has been drained to a depth of four feet. The field was laid down to permanent pasture about 20 years ago; at that time it received a heavy dressing of chalk, and has since been occasionally dressed with road scrapings and one or two light dressings of dung. It was only in fair condition when the experiments were commenced in 1898. The whole field was mown for hay in 1898 and 1899. All the manures were applied at the end of December, 1897, except the nitrate of soda, which was applied in the first week of the following April. In December, 1898, one half of each plot received a further similar dressing of manure for 1899, the nitrate of soda being applied in the following April.

The following tables give the results calculated per acre on the portions of the plots that were manured in 1898 only, and also on the portions that were manured in 1898 and 1899.

The first table shows that all the dressings have given a result, not only in the first, but also in the second year after their application. It shows also that basic slag has proved more economical as a phosphatic manure than superphosphate. Plot 4, however, shows that the addition of nitrate of soda to basic slag has not repaid the cost for the two years. The addition of kainit on plot 5 to the manures

applied to plot 4 shows that a potash manure has been moderately effective in increasing the bulk of the produce.

Manured 1898 only.

Plot.	Manure per Acre.	Cost per Acre.	Weight of Grass (Green) per Acre.		Increase in two years over unmanured plot.	Value of increase at £1 a ton.
		1898	1898.	1899.		
		£ s. d.	tons cwt. lb.	tons cwt. lb.	tons cwt. lb.	£ s. d.
1	No Manure - - -	—	3 15 0	2 3 84	—	—
2	3½ cwt. Superphosphate -	0 9 2	4 18 74	3 8 34	2 8 24	2 8 2
3	5 cwt. Basic Slag - -	0 11 3	5 8 54	3 14 12	3 3 94	3 3 10
4	5 cwt. Basic Slag - - } 1 „ Nitrate of Soda }	0 19 9	5 12 106	3 18 64	3 12 86	3 12 9
5	1 cwt. Nitrate of Soda } 5 „ Basic Slag - - } 3 „ Kainit - - }	1 7 3	5 14 32	4 7 106	4 54	4 3 6

Manured 1898 and 1899.

Plot.	Manure per Acre.	Cost per Acre.	Weight of Grass (Green) per Acre.		Increase in two years over unmanured plot.	Value of increase at £1 per ton.
		1898-1899.	1898.	1899.		
		£ s. d.	tons cwt. lb.	tons cwt. lb.	tons cwt. lb.	£ s. d.
1	No Manure - - -	—	3 15 0	2 3 84	—	—
2	3½ cwt. Superphosphate -	0 19 2	4 18 74	4 3 4	3 2 106	3 3 11
3	5 Basic Slag - - -	1 3 1½	5 8 54	4 4 42	3 14 12	3 14 1
4	5 cwt. Basic Slag - - } 1 „ Nitrate of Soda }	2 0 4½	5 12 106	5 10 30	5 4 52	5 4 5
5	1 cwt. Nitrate of Soda } 5 „ Basic Slag - - } 3 „ Kainit - - }	2 15 4½	5 14 32	6 4 12	5 19 72	5 19 8

In the second table the results are shown where the manures have been applied two years in succession. It is again seen here that in all cases the manures have given good results, and that basic slag still proves more useful than superphosphate. The nitrate of soda will be seen to have been more useful where it has been employed for two years in succession. The last column of both tables shows the value of the increase of the different manures, this increase being valued at £1 a ton. It is reckoned that 2½ tons of green grass will produce about one ton of hay.

The results, so far as the weight of herbage is concerned, show that all the manures have given a profitable increase. That given on plot 3 by basic slag is especially striking.

The plots were carefully examined before being mown as hay. Plot 1, where no manure had been applied, was distinctly the poorest plot; the grasses, although present in abundance, were weak and the bottom herbage was poor. This plot looked very poor when contrasted with the rest of the field which was dressed with basic slag. On plot 2 (superphosphate) there was a good, thick, even sward, white and yellow clover being much developed, and stemmy grasses abundant. On plot 3 (basic slag) there was even more white clover and leguminous herbage; here the quality of the bottom herbage was the best. On plot 4 (basic slag and nitrate) the nitrate had largely developed the grasses and increased the bulk, but the quality of the herbage was not so good. On plot 5, where kainit (a potash manure) was added, the quality of the herbage was distinctly improved, the bottom being greener, with more clover present.

For improving the bulk and quality of the herbage basic slag has in this case undoubtedly been most useful; it was not to be expected that the potash manure would have a considerable effect on this heavy land.

These results have been made on a clay loam, which has been lying for a considerable time in pasture, and which is probably deficient in lime. The value of the herbage has been very much improved for grazing purposes by the phosphatic manures, especially by basic slag, while the potash manure has also greatly improved the quality. The tables, therefore, do not show the full improvement given by these manures. On the other hand, where nitrate of soda has been applied the bottom herbage is coarser, and not so suitable for grazing purposes, nor is the quality of the hay anything like as good on these plots.

The results at Herriard up till 1898 have been published in the annual report of the Board of Agriculture on the Distribution of Grants for Agricultural Education, but the additional results for 1899 shown below are very striking.

The experiments are being made at Herriard Park,

Basingstoke, on "Bower's Meadow." This is an old pasture, the soil being a clay loam of considerable depth; the subsoil is clay, varying from six to twelve feet in depth, resting on chalk. The pasture was rough and benty to begin with, and was producing a considerable amount of herbage of an inferior character. The plots are each $\frac{1}{10}$ acre in area. The experiments were commenced in 1896, and in that year all the manures were applied during the first week in April, after all the plots had been well harrowed with heavy toothed chain harrows. In January, 1897, the upper half of each plot was manured in the same way as in 1896, the nitrate of soda not being applied till early in April. In 1898 no manures were applied, but the upper half of each plot was manured for 1899 in the same way as for 1897. A portion of each plot ($\frac{1}{10}$ acre) was fenced off in the spring of 1897, and the results on these portions for 1897 and 1898 are shown in the following tables. As no portion of the plots was mown in 1896, the results for that year cannot be shown. The plots were grazed along with the field in 1896, and the unfenced portions were again similarly grazed in 1897, 1898, and 1899. The aftermath, or second cut of grass, on the mown portions of the plots, has been regularly grazed.

In the spring of 1897 the pasture was very rough and covered with coarse herbage, which considerably decreased its grazing value; the plots were then harrowed with heavy toothed chain harrows, and the portion of the field so harrowed is now a very much better pasture.

The first table below shows the striking effects of the different manures in the fourth season after their application. Superphosphate now gives very little increase over the unmanured plot; basic slag still gives a considerable increase, and so does basic slag with sulphate of potash. In the last two cases the quality of the pasture is still greatly superior, the herbage being much closer and sweeter at the bottom, with more clover plants present; where nitrate of soda was added to basic slag and sulphate of potash in 1897 the weight of the herbage is now less than on plot 4 and the quality is not so good.

The second table shows the effects of three dressings of

manures over the four years. Superphosphate on plot 2 gives a satisfactory result, but basic slag on plot 3 is far more satisfactory, while sulphate of potash added to this latter on plot 4 gives a slight increase. On these two plots again the

Manured 1896 only.

Plot	Manure per Acre.	Cost per Acre, 1896.	Weight of Grass (Green) per Acre.			Increase in three years over Unmanured Plot.	Value of Increase at £1 a ton.
			1897.	1898.	1899.		
		£ s. d.	tons cwt.lb.	tons cwt.lb.	tons cwt.lb.	tons cwt.lb.	£ s. d.
1	No Manure - -	—	4 19 85	1 11 68	4 10 0	—	—
2	3½ cwt. Superphosphate - -	0 9 2	6 8 37	2 4 12	4 12 96	2 3 104	2 3 11
3	5 cwt. Basic Slag -	0 12 6	7 17 43	3 0 80	5 7 56	5 4 26	5 4 2
4	5 cwt. Basic Slag - 2 " Sulphate of Potash - -	1 8 11	6 11 101	3 5 60	5 10 0	4 6 8	4 6 0
5	1 cwt. Nitrate of Soda - - 5 cwt. Basic Slag - 2 " Sulphate of Potash - -	1 17 11	6 10 0	3 0 20	4 16 88	3 5 67	3 5 7

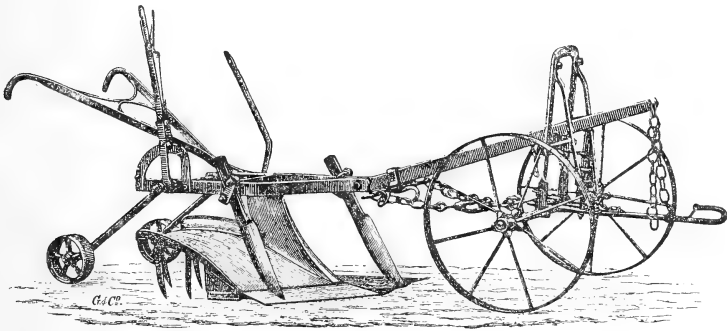
Manured 1896, 1897, and 1899.

Plot	Manure per Acre.	Cost per Acre, 1896, 1897, and 1899.	Weight of Grass (Green) per Acre.			Increase in three years over Unmanured Plot.	Value of Increase at £1 a ton.
			1897.	1898.	1899.		
		£ s. d.	tons cwt.lb.	tons cwt.lb.	tons cwt.lb.	tons cwt.lb.	£ s. d.
1	No Manure - -	—	5 10 80	1 10 20	3 13 24	—	—
2	3½ cwt. Superphosphate - -	1 8 4	7 10 27	2 10 100	5 13 104	5 0 107	5 0 11
3	5 cwt. Basic Slag -	1 14 4½	7 15 80	3 10 80	7 2 56	7 14 92	7 14 10
4	5 cwt. Basic Slag - 2 " Sulphate of Potash - -	4 1 9½	7 14 85	4 2 16	7 14 72	8 17 49	8 17 5
5	1 cwt. Nitrate of Soda - - 5 cwt. Basic Slag - 2 " Sulphate of Potash - -	5 8 6½	8 18 91	4 5 100	8 15 80	11 6 35	11 6 3

quality of the herbage is greatly superior to that on the others. On plot 5 the three successive dressings of complete manure have given great bulk of herbage, but this is coarser in quality. A close examination of the grazed portions of the plots indicates that for grazing purposes the pasture has been improved to the largest extent by basic slag and sulphate of potash *without* the addition of nitrate of soda.

DOUGLAS A. GILCHRIST

AN EXPERIMENT WITH A TURF PLOUGH.



Of late years much attention has been given to the improvement and renovation of grass land. As a rule the accomplishment of the object has been attempted through the agency of manure, though not unfrequently one hears of good results attending purely mechanical methods, such as scarifying. It is generally believed that this method of renovation depends for its success partly upon the removal of moss and dead grass, but chiefly upon the improved aeration of the soil as a consequence of the surface being torn by the tines of the harrow or other scarifying implement.

In the "Deutsche Landwirtschaftliche Presse," of March 7th, 1896, an entirely novel implement was figured and described by Professor Strecker, of Leipzig, under the name of Laacke's Wiesenschälplug. This implement has much that is attractive about it, and a specimen was obtained for use on Cockle Park in November, 1897.

It cuts a strip of turf fully 12 inches wide, and varying in depth from 3 to 6 inches, raises it clear of the ground,

stirs the soil underneath or not—as may be desired—and replaces the turf in its original position. Its weight is under 3 cwt., and its price £5 10s. In land that is fairly clear of stones it does its work perfectly, is not a heavy draught for two horses, and gets over about two acres daily. The accompanying illustration shows the implement ready for work.

The immediate results of the work of this plough are:—

- (1) Air is freely admitted to the soil to a depth which is usually about three or four inches.
- (2) The roots of all plants are cut at a similar depth.
- (3) The soil, to the depth of two inches or so below the lower surface of the “furrow,” is loosened, or otherwise, as is desired.

In November, 1897, the plough was used on a few acres in two pasture fields in Cockle Park. It was tried upon land that had previously been treated with phosphates and on land that had received nothing, and it was also used with and without an accompanying dressing of basic slag. In one case the basic slag was introduced underneath the turf at the moment when it was passing over the breast of the implement. So far as ocular inspection can be depended on to determine the result, little if any benefit to the pasture has followed the use of the implement.

In order, however, to bring the results to the test of definite figures, the plough was also used on certain half-acre plots in a grass-field that is annually cut for hay. This field has been sown down to grass for about twenty years, and represents a poorish type of meadow. The soil—a moderate loam resting on boulder clay—is one that might be expected to benefit from aeration.

The manures in each case consisted of a mixture supplying per acre $\frac{5}{8}$ cwt. sulphate of ammonia, $\frac{7}{8}$ cwt. nitrate of soda, $1\frac{1}{2}$ cwt. basic slag, $1\frac{3}{4}$ cwt. superphosphate, and $1\frac{1}{2}$ cwt. sulphate of potash (50 per cent. purity). The basic slag and sulphate of potash were applied immediately after “ploughing” in November, 1897, and again in the autumn of 1898; while the other substances were applied towards the

end of March in the succeeding spring of each season. Details of the treatment are shown in the table:—

Result of Using Laacke's Turf Plough.

Plot.	Treatment for Season 1898, (the manuring was for both 1898 and 1899.)	Yield of Hay.			Botanical Analysis, 1899.								
		1898	1899	Total	Dogtail.	Fescues.	Fiorin.	Vernal.	Yorkshire Fog.	White Clover.	Ribwort.	Various.	Total.
		cwt.	cwt.	cwt.									
1	"Ploughed," soil stirred, manured, not rolled - - - - -	34	24½	58½	14·7	11·2	38·3	1·8	19·7	2·7	1·4	11·2	100
2	"Ploughed," soil stirred, rolled, manured - - - - -	37	23½	60½	18·7	9·2	31·8	3·0	26·3	2·6	2·3	6·1	100
3	"Ploughed," soil stirred, rolled, not manured - - - - -	22	15½	37½	22·0	9·4	32·5	1·6	21·0	1·8	3·1	8·6	100
4	Neither "ploughed," stirred nor rolled, but manured - - - - -	50	24½	74½	14·1	11·0	31·9	3·1	21·6	3·6	4·4	10·3	100
5	Altogether untreated - - - - -	34½	16½	51	16·2	7·8	35·6	2·5	15·7	4·5	5·0	12·7	100
6	"Ploughed," rolled, manured, not stirred - - - - -	39½	25	64½	10·1	10·4	33·5	1·6	29·1	3·7	2·7	8·9	100

The effects of the treatment on unmanured ground are seen by comparing plots 3 and 5.

On plot 3 the turf was "ploughed," the soil underneath was stirred, and the land was subsequently rolled, with the result that in the first season the hay crop was reduced from 34½ cwt. to 22 cwt., while in the second season the reduction was from 16½ cwt. to 15½ cwt.

A comparison of plots 2 and 4 will show what the plough was able to accomplish, when accompanied by manure. The use of the implement—with simultaneous stirring of the soil and subsequent rolling of the land—resulted in a reduction of the crop in 1898 from 50 cwt. to 37 cwt., while the yield in 1899 also suffered to the extent of 1½ cwt. per acre.

It will thus be seen that, whether used alone or in conjunction with a dressing of artificial manure, the plough has very seriously reduced the yield in the first season, while its prejudicial influence is still observable, though not to so great an extent, in the second year.

Seeing that the plough has failed to improve the yield, but little practical interest attaches to the effects of rolling or stirring. It may, however, be pointed out that rolling

'compare plots 1 and 2) cannot be said to have had any marked effect, but stirring the soil (compare plots 2 and 6) has, in both years, reduced the yield to the extent of about two cwt. per acre.

In the season immediately succeeding the autumn in which the work was done, it was very evident that the treatment had materially affected the relative abundance of the various plants, and, more particularly, the scarcity of ribwort on the "ploughed" plots was very conspicuous. This result might have been anticipated when it is remembered that this plant has a very pronounced tap-root, which would, of course, be severed by the share of the plough. The botanical analysis of the herbage of 1899 shows that seven plants constituted about 90 per cent. of the total weight of material. Of these, comparison of the respective plots will show that "ploughing" combined with stirring and rolling, resulted in a reduction in the case of fiorin, sweet scented vernal, white clover, and ribwort, whereas there was a marked increase of crested dogs-tail, and Yorkshire fog. The various species of fescue were, on the whole, but little affected.

If the average of plots 2 and 3 be compared with that of plots 4 and 5, and if the percentages of the various plants be converted into actual weight per acre, we have the following results :—

	Pounds per acre of the undernoted plants in 1899.						
	Dogs-tail.	Fescues	Fiorin.	Vernal.	Yorkshire Fog.	White C over.	Rib-wort.
"Ploughed," stirred, and rolled (plots 2 and 3)	443	203	701	50	515	48	59
Not ploughed, stirred or rolled (plots 4 and 5)	347	216	774	64	427	92	108

Finally, it may be interesting to note whether artificial manures acted better on such "ploughed" land, or on

ground that had not been disturbed. The following figures show the increases per acre due to manure :—

	1898.	1899.	Total.
	Cwt.	Cwt.	Cwt.
Manures applied to "ploughed" } ground (compare plots 2 and 3) - }	15	7 $\frac{3}{4}$	22 $\frac{3}{4}$
Manures applied to "unploughed" } ground (compare plots 4 and 5) - }	15 $\frac{1}{2}$	8 $\frac{1}{4}$	23 $\frac{3}{4}$

The results, it will be seen, are each year slightly against the "ploughed" ground, so that not only is the ploughing in itself harmful, but it also prevents manures exercising their full effects.

WILLIAM SOMERVILLE.

A NEW PHOMA DISEASE OF THE SWEDE.

The disease of which I am now treating is, I believe, one which has hitherto escaped notice, and it has not been described as occurring in this country; but I have reason to believe that it is not at all uncommon in the North of England. Some years ago, in the winter of 1896-7, I first noticed the appearance of this parasitic attack of the swede at Corbridge. It has since occurred at intervals in other neighbouring localities, and last autumn I found it on the experimental plots at the Northumberland Experimental Farm at Cockle Park, on some of which it had obtained considerable hold. At Cockle Park the percentage of roots attacked varied in the different fields; where the disease was most noticeable some of the rows had as many as 25 per cent. attacked, while in other fields scarcely one per cent. was found.

The disease, when fairly advanced, is easily recognisable by certain pale straw-coloured to brownish patches contrasting strongly with the ordinary colour of the root, and by the large, dry cracks, some penetrating deeply into the flesh, which form a very prominent characteristic (Fig. 1). The natural purple colour of the swede is destroyed and replaced by these discoloured patches, which form areas of depression on the surface of the root; and surrounding the lighter central portion of the patch is a narrow border of darker metallic green, which shades into a dark purple merging gradually into the normal tone of the still healthy tissue. Numerous small spots of the deep purple-green encircling a central lighter spot indicate the commencement of attacks (Fig. 2 A). These gradually enlarge, the attack



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Fig. 1.—Swede attacked by PHOMA, showing four centres of infection.



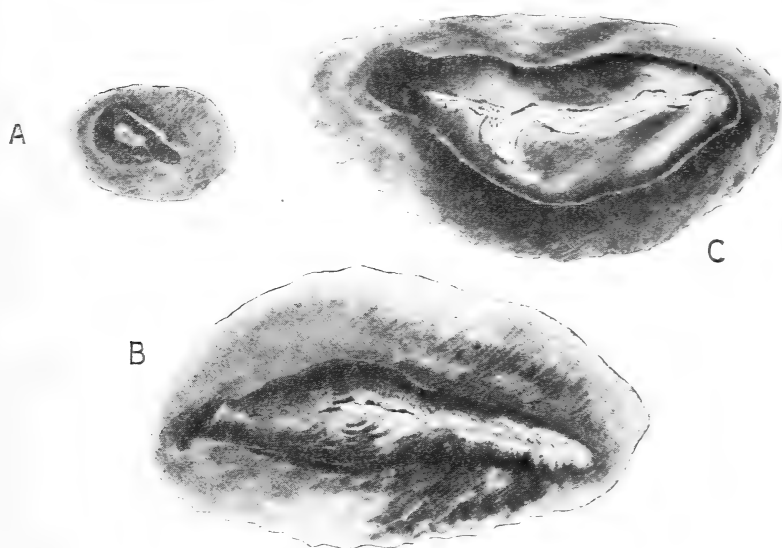


FIG. 2.—Features of the commencement of the attack. A—Soon after infection. B and C—Somewhat later. In C the rind is peeling off, and the pycnidia are already appearing beneath it. From Cockle Park. Nat. size.

spreading transversely rather than vertically, and soon the external corky layer cracks in the centre (Fig. 2 B); in a somewhat later stage it becomes further torn apart with a tendency to peel off in flakes (Fig 2 C), and at this time, too, numerous small black dots (pycnidia) appear. As the disease spreads the tissues rupture more completely, the crack extends in the direction of the longer axis of the diseased area, and gradually deepens and widens till great dry fissures are produced, such as are seen in Fig. 1. A vertical section through a similar fissure measuring 11 cm. in length showed it to penetrate to a depth of $\frac{1}{4}$ cm. One striking characteristic of the disease is the dry condition of the attacked cells; the rind easily separates as a dry papery layer. This drying up of the cells is apparent in the very initial stages by the sinking in to form a slight depression, and later on is more strongly marked by the further shrinkage following upon the entire collapse of the cells, and the formation of deeper hollows and the large fissures already described.

Such is a description of the external features of the disease. An examination of the internal tissues by the microscope

reveals the presence of numerous septate hyphæ in the cells (Fig. 3); and the structure of the numerous small black dots referred to above show them to be the pycnidia characteristic of the genus *Phoma*. These pycnidia are special organs for the production of the spores (conidia) of this fungus: each pycnidium may be described as a small bag whose wall consists of a layer of minute cells, and lining the interior are



FIG. 3.—Section from an attacked Swede, showing the hyphæ permeating the cells, and breaking down the cell walls. (Drawn with Zeiss D, OC. 4).

special hyphæ upon which the spores are born. When ripe the pycnidium, which is then densely packed with spores, bursts apically (Fig. 4 A, B), and the spores, adhering together, emerge, in this species, as a small globular mass of a pale or deep rose colour to carmine (Fig. 5); or under dryer conditions they may assume a vermiculate form. In a damp atmosphere the spore-mass spreads out as a rose-coloured slime. The spores soon separate from each other, and may then be disseminated by various agencies.

The spores are extremely numerous and very minute, measuring only 4μ . by 2μ . Pure cultures were obtained by removing the spores as they emerged from the pycnidium

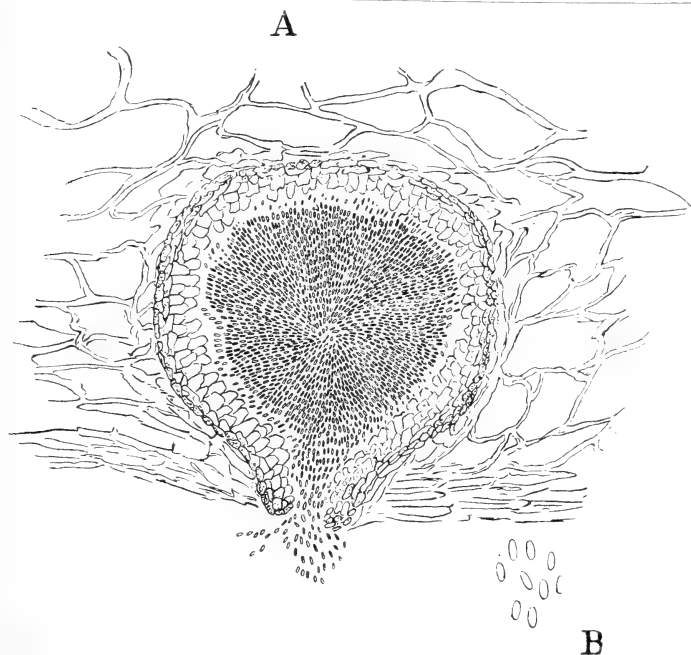


FIG. 4.—A—Section of a ripe pycnidium partially embedded in the superficial tissues of the host. The spores are seen emerging from the apical pore. (Zeiss D, OC. 4.) B—Group of spores highly magnified.

by means of a sterile needle and sowing upon a suitable medium under sterile conditions. I found them to germinate readily upon a medium composed of a broth of steamed swede, neutralized and rendered solid by the addition of

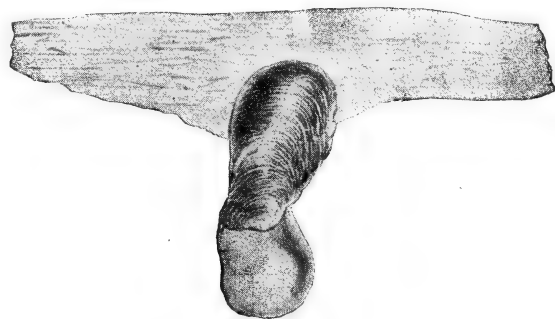


FIG. 5.—A spore-mass issuing from a pycnidium. (Zeiss E, OC. 2).

five per cent. gelatine. The germination could clearly be observed under the microscope. First a germ-tube (Fig. 6 a and b) was protruded and prolonged into a hypha,

which soon became septate, and then, branching and rebranching repeatedly, grew eventually into a dense white mycelium. If the spores were not sown too thickly, as they germinated, it was possible under the microscope to remove the young mycelium growing from a single spore and transfer it for

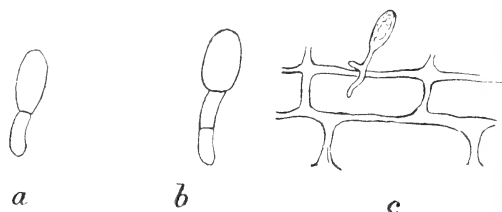


FIG. 6.—*a* and *b*—Spores germinating on a gelatine medium three days after sowing. (Leitz obj. 7, O.C. 2). *c*—Spore germinating on the host plant; the germ-tube is seen entering an external cell. (Zeiss E, OC. 3).

cultivation upon special media. Many cultures were made in this way upon various nutrient gelatines, but, so far, these have not resulted in the production of any organs of fructification.*

When the spores were sown upon a piece of living swede germination also readily took place. Part of a perfectly sound root was prepared by washing the rind in a weak solution of corrosive sublimate to sterilise it,† and then thoroughly washing away the antiseptic with several changes of sterile water; small blocks were then cut from it with a sterile knife. When placed upon the rind of these blocks the spores germinated exactly as on gelatine, and the germ-tube quickly effected an entrance into the external cells (Fig. 6 *c*); the hyphæ then branching and making their way from cell to cell, soon permeated the cells and intercellular spaces (Fig. 3), causing the death of the protoplasm and

* It has not been thought advisable in a short paper of this description to give an account of the special media employed, or minute details of the methods of sterilization. Suffice it to say that every proper precaution has been taken throughout to ensure pure cultivations.

† It might be objected that the washing with corrosive sublimate would destroy the cells, and the fungus might thus enter as a saprophyte, but the protoplasm would be protected by the external cell-walls, and a careful microscopic search failed to detect any injury to the protoplasm. The conidia germinate and enter the host quite as readily when this aseptic treatment has not been adopted.

breaking down the tissues of the host. The mycelium spread superficially, and as the hyphæ attacked the living cells, these lost their turgidity, the cell-sap evaporated, and, as a result, the cells dried up, causing the depressions, and finally the cracks, to appear. The change of colour was also well marked, the purple colour held in solution was destroyed (probably by an acid secretion of the fungus), unmasking the green of the chlorophyll corpuscles, which, later on, was itself destroyed, and only the colourless dead cells remained within the area of the spreading hyphæ. In a short time the pycnidia were developed, being at first embedded in the superficial tissues; but, later on, as they reached maturity, they emerged, and the dehiscence of the spores took place. The cycle was thus completed from spore to spore in the cultivations on the swede. Artificial attacks of *Phoma* were repeatedly produced in this manner, and afford convincing proof that the disease is due to this fungus, and that it is spread by means of the spores.

Phoma occurring in the pycnidial stage is probably only a part of the life cycle of some other fungus, but if this is so and what fungi [complete the cycle is at present uncertain. Prillieux* and Delacroix consider that *Phoma Beta* is a stage in the life cycle of *Sphaerella tabifica*, an ascigerous form found on the dead petioles of the beet. These authors, however, admit that this has not been incontrovertibly proved by actual cultures. Hitherto I have been unable to find any *Phoma* attack on the leaves of the swede, or any ascigerous stage.

The genus *Phoma* is accredited with a large number of species, Saccardo† enumerates as many as 638. Frank‡ gives 44, which are parasitic on various host plants, three of which attack the cruciferous genus *Brassica*. I believe the *Phoma* to be more generally destructive to cultivated crops in Great Britain than is commonly recognised. *Phoma Beta*

* Prillieux, *Maladies des Plantes Agricoles*, Tome II., 1897.

† Saccardo, *Sylloge Fungorum*, Vol. III, 1884.

‡ Frank, *Die Pilzparasitären Krankheiten der Pflanzen*, 1896.

is perhaps one of the best known species. Frank has given a full account of its attack upon the leaves and root of the sugar beet, but he only cites it as occurring in France and Germany. McWeeney* has since noted the appearance of the disease in Ireland; and its distribution is extended to the north of England by my discovery of its presence on a farm at Riding Mill, near Newcastle, in 1896, where many of the mangel roots were found strongly attacked by *Phoma Beta* when the pits were opened in the spring. Rostrup† has also described a *Phoma* attack on the carrot under the name *P. sanguinolenta*.

The only reference to any similar attack of the swede which I have been able to find is a short note by Rostrup of a *Phoma* attack in Denmark. He describes it under the name *P. napobrassicæ*, and states that "The disease at present has only been observed appearing to any great extent on a large farm at Falster, and is not known in foreign countries." It is possible that the attacks occurring in England and Denmark may be due to the same species, but Rostrup gives no figures or measurements of the spores and mentions no cultures, and his description is too meagre for any certain determination. Prillieux' description of *Phoma Brassicæ* (Thüm), which attacks the stalks of cabbages and has been especially destructive in the west of France, agrees very closely with the form I am now describing on the swede. The shape and measurement of the spores are the same, but Prillieux does not mention the colour of the emergent spore-mass. The characters given of *P. sanguinolenta* are also very similar, notably that of the colour of the spore-mass. These may eventually prove to be forms of the same species.

With reference to methods of checking the disease, it is at present only possible to suggest general principles of remedial treatment, which, from researches into the nature and growth of fungoid diseases, we know to be essential. Having

*McWeeney, Observations on *Phoma Beta* (Frank), a Fungus that injures Mangel. Journal Roy. Agric. Soc. Eng., Series III., Vol. VI., 1895.

† Rostrup, Sygdomme hos Landbrugsplantner, 1893.

regard to the manner in which the disease is spread by means of the spores, it is obvious that the roots should be carefully examined in the autumn with the object of detecting any indications of disease, and those found to be affected should at once be taken up and destroyed by burning. To leave old roots and leaves lying about is a fatal method of perpetuating disease; the spores are very readily blown about and carried from field to field, and the rotting roots are bound to be a source of future infection. They may provide the very home required in which to continue the secondary life-cycle which so often enables a fungus to exist until the old conditions suitable for its first stage of existence come round once more. Great attention should also be given to ensure a thoroughly dry place for storage, and that as far as practicable there should be a free passage of air through the stored roots, for it is just in moist, warm chambers that the fungus obtains the conditions most suitable to its rapid growth and reproduction. I would, moreover, suggest that the influence of manures and various food substances in the soil on the predisposition to the disease should form an important subject of investigation. In this connection it should be noted that I failed to infect swedes growing in the Botanic Garden in Newcastle, and only succeeded upon roots obtained from Cockle Park. It might be supposed that the special manurial treatment at the latter station rendered the swedes more susceptible to the attack, while those in Newcastle were resistant in a high degree; and it would be interesting to know whether the proportion of diseased roots in the different plots bore any relation to the different manurial treatment, but at present this point waits further elucidation.

Characters of the Phoma on the Swede.

Pycnidia.—Numerous, ovoid, black; about $\cdot 3$ mm. in diameter; subcutaneous but afterwards exerted, opening by an apical pore.

Conidia.—About $4\ \mu$ long, breadth half the length; cylindrical with rounded ends; emerging from the pycnidia as a globular or vermiform mucilaginous mass of a pale or deep rose colour to bright carmine; single conidia appear colourless, but when aggregated together are of a distinctly purplish tint.

Hyphæ.—Colourless; septate.

Symptoms of Attack. — Light or darker straw-coloured shallow depressions, surrounded by a dark green border merging into purple, which enlarge and extend over the surface of the root; eventually deep transverse fissures formed by the drying up of the cells. Pycnidia in the fissures and on the dead cells of the root. Point of attack only on the parts of the root above ground.

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IMPORTS OF AGRICULTURAL PRODUCE IN 1899.

Imports of live animals in 1899 showed some decline, although this was more than counterbalanced by an increase of dead meat. The cattle imported were fewer by over 65,500, the United States and Canada, which send over four-fifths of our supply, accounting for nearly the whole of the reduction on the year, the receipts from Argentina, the only other important source of supply, being but 4,000 less than in 1898. The sheep received in the United Kingdom were also less by 56,000 than in 1898; the shipments from Argentina, whence the largest number of live sheep now come, account for the entire fall. A decrease of over 20,000 from the United States is balanced by an increase from Canada. The average value per head of imported cattle was, however, somewhat higher than in 1898, being £17, as against £16 10s.; and, in the case of sheep, 31s., as against 29s. 8d.

All kinds of dead meat, except salted beef, showed an increase. In fresh beef the augmentation was as much as 700,000 cwts., or nearly 23 per cent. The United States furnished nearly three-fourths of the fresh beef; but Australasia and other countries also shared in the increase. The value per cwt., which works out to 38s. 8d., was about 6d. higher than in 1898. The total increase in the imports of fresh mutton was only 4 per cent., both Australasia and Argentina, which supply more than 90 per cent. of this kind of meat, contributing to the advance. The rise in the value of imported mutton to 31s. 7d. per cwt. is substantial, and represents an advance of 2s. over the value of 1898. The 20 per cent. increase in the imports of fresh pork is not due to the United States, which, however, well maintained its

shipments with 277,000 cwts. last year, but to Holland, which had been surpassed by the United States in 1898, but which now retakes the first place with 344,000 cwts.

The very small increase in hams (6,300 cwts.) was due to Canada, which increased its shipments by over 33,000 cwts., while the receipts from the United States decreased by nearly 28,000 cwts. The increase in bacon was from Denmark (nearly 200,000 cwts. more than in 1898), the United States supply (4,089,000 cwts.) remained stationary, while the Canadian quota fell from 536,000 to 454,000 cwts. The value of bacon declined slightly, that of hams increased, in the year.

Table 1.—Imports of Live Animals (for Food) and Dead Meat.

Description.	Quantities.		Values.	
	1898.	1899.	1898.	1899.
	No.	No.	£	£
Cattle - - - -	569,066	503,504	9,399,793	8,572,114
Sheep - - - -	663,747	607,755	984,863	942,891
Swine - - - -	450	2	1,020	7
Live Animals, Total -	—	—	10,385,676	9,515,012
	Cwts.	Cwts.		
Beef, Fresh - - -	3,100,821	3,802,622	5,915,705	7,344,724
„ Salted - - -	208,945	178,183	273,004	230,943
Mutton - - - -	3,314,001	3,446,022	4,902,179	5,439,407
Pork, Fresh - - -	557,602	668,972	1,165,380	1,403,041
„ Salted - - -	275,993	284,720	319,778	305,829
Bacon - - - -	5,711,322	5,804,583	10,321,674	10,400,602
Hams - - - -	1,972,299	1,978,621	3,894,839	4,094,500
Meat, unenumerated, Salted or Fresh -	414,977	464,782	812,738	883,363
Meat, unenumerated, Preserved - - -	574,937	652,424	1,802,440	1,896,733
Rabbits (dead) -	314,398	377,291	572,603	638,655
Total Dead Meat - -	16,445,295	17,658,220	29,980,340	32,637,796

Estimating the amount of dead meat to be obtained from the live animals imported, and adding this total to the quantity of actual dead meat in the above table, it appears that our imports of all kinds of meat amounted to something

like 21,362,000 cwts., compared with about 20,663,000 cwts. in the previous year, or an increase of about 700,000 cwts.

The decline noted in 1898 in the imports of dairy produce has not been continued, the total value of the milk, butter, margarine, cheese, and eggs imported having last year been about £2,570,000 more; our total expenditure on these commodities amounting to £31,778,000. Excepting only fresh milk and cream, all these products came in increased quantities.

Table II.—Imports of Dairy Produce.

Description.	Quantities.		Values.	
	1898.	1899.	1898.	1899.
	Cwts.	Cwts.	£	£
Butter - - -	3,209,153	3,389,851	15,961,783	17,213,516
Margarine - - -	900,615	953,175	2,384,384	2,549,376
Cheese - - -	2,339,452	2,389,313	4,970,242	5,515,091
Milk, Condensed	817,274	824,618	1,435,951	1,456,033
Milk and Cream, Fresh	10,691	7,859	11,193	16,068
	Gt. Hundreds.	Gt. Hundreds.		
Eggs - - -	14,424,601	16,174,760	4,457,117	5,044,392

The largest receipt of butter again came from Denmark, although the quota thence (1,430,000 cwts.) was slightly less than in 1898. France, with 354,000 cwts., and Holland with 285,000 cwts., send us the next largest supplies to those furnished by Denmark, and Canada now takes the fourth place among the countries supplying us, 250,000 cwts. having been received from that colony. The total increase in butter imports is mainly accounted for by Canada, Victoria, the United States, and New Zealand. The French shipments fell off by 63,000 cwts., and the Swedish (246,000 cwts. in 1899) by about 50,000 cwts. Of the other countries exhibiting an increase, the United States exports to our ports rose from 67,000 to 159,000 cwts., the Victorian from 124,000 to 212,000 cwts., and the New Zealand from 70,000 to 112,000 cwts. The average value per cwt. was declared at 101s. 6d., as compared with 99s. 6d. in the previous year.

An increase amounting to nearly 6 per cent. is to be remarked in margarine in 1899, and the quantity is the

largest imported since 1894. As usual, nearly the whole of it came from Holland.

Cheese shows only a small increase—about 2 per cent. From Canada we obtained 1,337,000 cwts., or 95,000 cwts. less than in 1898. This loss was apparently the gain of the United States, which sent 105,000 cwts. more, or 591,000 cwts. in all. The average declared value rose from 42s. 6d. to 46s. per cwt.

The increase in eggs is large, the additional 1,750,000 great hundreds representing an advance of 12 per cent. More eggs were received from nearly all countries, except Canada, whence the imports fell from 745,000 to 647,000 great hundreds. Russia again increased its pre-eminence as an exporter, advancing its supplies from 3,646,000 to 4,319,000 great hundreds. Germany, with 3,455,000 great hundreds, also showed an increase of 600,000. Nearly all the remainder came from Denmark, Belgium, and France, in practically equal amounts, viz., from $2\frac{1}{4}$ to $2\frac{1}{2}$ million great hundreds. There is recorded a very slight increase in value, viz., 6s. 3d. per great hundred, instead of 6s. 2d., in spite of the increasing preponderance of the cheap Russian eggs, valued, on the average, at 5s. 6d. per great hundred in 1899.

The receipts of condensed milk were very slightly larger in the past year, but their value is quoted as greater by about 2d. per cwt. Fresh milk and cream, however, of which the imports were considerably smaller, exhibited an important rise in value, the average, 41s. per cwt., comparing with 21s. per cwt. in 1898, a change probably indicating the greater proportion of cream now imported. It may be noted that from France, which was the chief source of supply in 1898, the imports were under 2,500 cwts. against 7,330 in the previous year. The French imports were valued at 15s. 4d. in 1899 as compared with 6s. 9d. per cwt. in 1898, a sign of considerable change in the character of the importation. Denmark, which sent 1,269 cwts. of milk and cream in 1898 at an average value of something under 35s. per cwt., sent last year more than twice as much, 2,888 cwts. at a value of 53s. 10d. per cwt. It thus appears that the average declared value of all kinds of imported dairy produce, except margarine, was higher in 1899 than in 1898.

The following table shows the imports of some miscellaneous animals and animal products.

Table III.—Imports of Miscellaneous Animals and Animal Products.

Description.	Quantities.		Values.	
	1898.	1899.	1898.	1899.
Horses - - - Nos.	42,921	43,900	£1,145,324	£1,143,297
Poultry and Game - -	—	—	637,492.	755,294
Lard Cwts.	2,106,871	2,188,049	2,587,501	3,068,985
Tallow and stearine „	2,021,941	2,061,137	2,066,433	2,389,931
Hides - - - „	1,237,366	1,210,525	2,905,964	2,799,166
Wool, Sheep and Lambs „	689,446,139	659,408,683	22,137,188	23,579,769

It will be seen that wool shows a decline in bulk of about 30,000,000 lbs., due mainly to smaller Australian supplies. In value there was nevertheless a total increase of £1,140,000, the average for the year standing at just over 8½d. per lb., or about ½d. per lb. more than in 1898. The re-exports, 292 million lbs., were 9 million more than in the previous year, so that the quantity retained for home consumption was reduced to 367,500,000 lbs. as compared with 406,600,000 in 1898. Lard showed an increase in quantity and value, as did tallow and stearine, which also showed a distinct rise in average value. Tallow, it may be noted, comes chiefly from Australasia, the consignments thence being about double those from the United States.

Turning to the vegetable products, our imports of grain and flour were larger than in 1898, but the value was less.

Of wheat and wheat flour (expressed as grain) we received 98,506,000 cwts. as against 94,418,000 cwts. in 1898. The increase was greater in the imports which reached us in the form of flour than in those which came as grain. The imports of wheat flour, indeed, were the largest ever recorded, exceed-

ing by 840,000 cwts. the previous maximum of 22,106,000 cwts. in 1892. The values of wheat in grain are shown as averaging 6s. 8d. per cwt. in 1899, compared with 8s. per cwt. in 1898; and flour is valued at 9s. 4d. instead of 11s.

The United States sent less wheat in grain, the total from both sides of the American Continent being 34,651,000 cwts. A bountiful harvest in the Argentine Republic enabled that country to take second place with 11,369,000 cwts., as against 3,983,000 in 1898 and 933,000 only in 1897. The third place was occupied by the British East Indies with 8,192,000 cwts., or about 1,346,000 cwts. less than 1898. Canada sent 5,256,500 cwts., an increase over the previous year; and Australasia, which in 1897 had sent no wheat, and only 212,000 cwts. in 1898, has now supplied 3,703,000 cwts. Russia, usually an important factor in our supply, failed to send more than 2,519,000 cwts., compared with 6,232,500 cwts. and 15,050,000 cwts. in 1898 and 1897 respectively. Four-fifths of the wheat-flour came from the United States (18,406,000 cwts.); but Canada sent 2,499,000 cwts., and it may be noted that the amount of wheat, both grain and flour, from this colony was the highest recorded.

Table IV.—Imports of Grain and Flour.

Description.	Quantities.		Values.	
	1898.	1899.	1898.	1899.
	Cwts.	Cwts.	£	£
Wheat - - - -	65,227,930	66,636,978	26,147,256	22,282,701
Wheat Meal, and Flour	21,017,109	22,945,708	11,545,443	10,700,990
Barley - - - -	24,457,004	17,189,358	6,791,472	4,960,332
Oats - - - -	15,577,900	15,626,630	4,382,857	4,199,724
Oatmeal - - - -	989,480	789,810	615,925	505,464
Maize - - - -	57,169,292	62,699,650	11,282,310	12,967,202
Maize Meal - - -	1,453,800	1,814,766	379,485	457,534
Peas - - - -	2,179,192	2,752,950	689,769	898,951
Beans - - - -	2,293,346	1,877,220	670,159	573,891
Other Corn and Meal	1,462,764	1,964,697	404,588	541,772
Total - - - -	—	—	62,909,264	58,088,561

The diminished supply of barley is one of the most noticeable features of the grain imports of the year. The

quantity of this corn is often liable to considerable variations, but so small an amount as 17,000,000 cwts. has not been entered since 1892. The decline affects all the countries enumerated, but is greatest from Roumania (1,326,000 cwts., as compared with 4,735,000 in the previous year) and Russia (7,807,000, instead of 10,267,000 cwts.). Oats show a small increase, but maize a large one; and it has again to be recorded of Indian corn that the amount is the largest we have ever received. The United States increased its contributions of maize from 37,466,000 to 39,460,000 cwts.; but the most important rise was in the exports from Argentina, which were 7,731,000 cwts., or more than double those of the previous year. Canada sent 2,600,000 cwts. less maize than in 1898. A great development appears to have taken place of late years in our imports of maize meal. Until 1896 on only two occasions had 100,000 cwts. been received; in 1897 the imports were over a million, and in 1899 they reached 1,815,000 cwts.

The average declared value of barley is given at 5s. 9d. per cwt., or 2d. more than in 1898. The value for imported oats comes out at 5s. 5d. (a fall of 3d.), while that of maize is 4s. 2d. (a rise of 3d.) per cwt.

Miscellaneous imports of vegetable produce are set out in the following table:—

Table V.—Miscellaneous Imports of Vegetable Produce.

Description.	Quantities.		Values.	
	1898.	1899.	1898.	1899.
Onions - - - bush.	6,002,515	7,008,298	£. 792,909	£. 854,782
Potatoes - - - cwts.	6,751,728	5,157,811	1,913,912	1,557,519
Vegetables, unenumerated - - -	—	—	1,680,786	1,744,068
Apples - - - bush.	3,458,716	3,861,172	1,108,056	1,186,143
Pears - - - „	491,669	581,832	221,779	266,351
Plums - - - „	922,248	558,273	434,666	294,052
Cherries - - - „	401,810	281,236	230,828	153,642
Hay - - - tons	116,107	131,504	—	—
Straw - - - „	71,966	64,819	—	—
Hops - - - cwts.	244,136	180,233	1,030,140	809,842
Flax - - - tons	97,253	99,052	2,932,646	2,927,355
Hemp - - - „	94,442	91,973	2,308,480	2,663,547
Wood and Timber (except Mahogany), loads	8,834,232	9,429,019	20,592,754	22,187,806
Clover and Grass Seeds cwts.	342,773	299,268	655,211	594,535

The imports of onions were greater by a million bushels, but this vegetable appears to have been considerably cheaper. Potatoes showed a somewhat large decrease, smaller consignments coming from Germany. Of fruit, apples and pears came in augmented quantities, but were, on the whole, cheaper; imports of plums and cherries were much reduced. An increase of about 13 per cent. in the imports of hay is recorded, and the total arrivals in 1899 were higher than in the preceding four years. These imports are, however, far below those of 1893 and 1894. While the receipts of hops were 26 per cent. less than in 1898, their declared value increased from about 84s. to about 90s. per cwt.

DESTRUCTION OF CHARLOCK.

This weed, which is common in cultivated fields throughout the whole of Great Britain, is known under a variety of names, such as yellowz, yellow weed, skellock, runches, wild mustard (*Brassica Sinapis* Vis., *B. Sinapistrum* Boiss., *Sinapis arvensis* L.). In general appearance it closely resembles the turnip, to which, in fact, it is very nearly related. As in the case of other plants of the same family, charlock seed contains a large amount of oil, and this is at least partly accountable for the persistent vitality often exhibited by this seed. Land that has been under grass for many years may thus, when broken up, show an abundant growth of this weed, and the same state of things not infrequently attends extra deep cultivation, and the consequent disturbance of dormant seeds.

Everything considered, charlock is perhaps the most troublesome weed with which the farmer of arable land has to contend. In corn crops its growth is often so rank as to seriously reduce the yield of grain. In root and bean crops the weed can be more easily dealt with; but here also it often proves very injurious, and especially so when the conditions of the weather or scarcity of labour prevent its timely eradication. As a rule it is not conspicuous amongst rotation grasses or clover, and it is practically absent from permanent grass land.

The injury induced by charlock is partly direct and partly indirect. It competes with crops for light and air; that is to say, it overgrows more or less, completely and smothers, other plants with which it is associated. It also robs crops of a part of their nutriment, and prevents their deriving full benefit from the moisture of the soil. But in other ways—though more indirectly—this weed may be the cause of much loss. The turnip “fly,” for instance, would be unable

to exist in early summer, when the cultivated crops on which it preys are, for the most part, absent from our fields, did it not find weeds like charlock to supply it with food. Then, again, the microscopic fungus that causes finger-and-toe finds a congenial habitat in the roots of this plant, which may thus do much to carry the disease over the years that separate two turnip crops.

In the case of root crops reasonable attention in the matter of horse and hand hoeing may usually be depended on to keep charlock in check. It is when present in spring corn crops that it is most troublesome. Various expedients have been tried with the view of curtailing the development of the weed. If the field be harrowed, and the sowing of the grain be somewhat delayed, a large proportion of the charlock seed will be induced to germinate, and the resulting plants may be afterwards destroyed by harrowing. Hand and horse hoeing may be practised—providing the corn has been drilled, and has not been sown down with grass or clover seeds. At a later stage of growth the flower heads may be more or less effectively knocked off by means of a special machine, the use of which diminishes the formation of seed, but does little to mitigate injury to the corn crop immediately concerned.

In 1897 attention was called to the possibility of getting rid of charlock in corn crops by means of the application of certain solutions which, it was contended, could destroy the weed without injuring the cereal. During the past two seasons this method of dealing with the pest has been extensively tested in Great Britain, and, as a whole, the results have been successful. The substances chiefly tried have been copper sulphate and iron sulphate, and good results have been got with both. Although the former at present costs about 30s. per cwt., as against 4s. to 5s. in the case of the latter, the solution of iron sulphate must be used so much stronger than the other that the difference in the cost of material is less per acre than would at first sight appear. Moreover, copper sulphate deteriorates less by keeping, is more easily manipulated, and does less injury to the clothes of the workmen.

Experience indicates that good results will, as a rule, be got by dressing an acre with, at most, 40 gallons of a 4 per

cent. solution of copper sulphate, or with a similar quantity of a 15 per cent. solution of iron sulphate. To make the former, dissolve 16 lbs. of copper sulphate, costing about 4s. 6d., in 40 gallons of soft water; while, in the latter case, 60 lbs. of iron sulphate, costing about 2s. 6d., are required in a similar quantity of water. Somewhat better results will be got by dressing an acre with 16 lbs. of copper sulphate dissolved in 60 gallons of water, thus making a $2\frac{2}{3}$ per cent. solution; but although this entails no extra outlay for material, it implies an increased expenditure on account of labour. Then, again, in place of applying 40 gallons per acre of a 4 per cent. solution at a single operation, superior results may sometimes be got by applying 30 to 40 gallons per acre of a 2 per cent. solution at a somewhat early stage of the growth of the weed, and a similar quantity ten days or a fortnight later. As compared with a single dressing this involves no extra expenditure on material, but it entails the application of about twice as much water, and the crop suffers more from mechanical injury. Good results have occasionally been got with weaker solutions and with smaller quantities than those indicated, but on the whole those recommended above have proved most effective.

The quantities indicated have been found to do no permanent harm to cereals, or to clover or grass occupying the ground along with the corn crop, but solutions for application to beans or peas should be considerably weaker than those used for corn crops, or for tares.

A convenient method of procedure is to have two 40-gallon barrels in use, so that while the contents of one are being distributed, the other may be used for the preparation of a fresh solution.

It may be noted that certain weeds closely allied to common charlock—especially wild radish, or white charlock, and smooth leaved-charlock—are not infrequently met with, and these do not readily yield to treatment. Other weeds such as docks and thistles are more or less crippled, without being destroyed, by the solutions.

To obtain the best results it is necessary to attend to the following points :—

1. The weed should not exceed three inches in height at the time of spraying, though fair success has sometimes attended treatment almost up to the time of flowering.
 2. The solution must be made with clean, and, if possible, soft water, and the vessels used in the process should be of wood.
 3. The material, especially of copper sulphate, should be bought under a guarantee of purity of 98 per cent. It should be obtained powdered, not in crystals. This facilitates the solution.
 4. The solution must be applied by means of a machine that generates a fine spray under air pressure. A hand machine of good construction will dress three or four acres in a day, while a horse machine will cover nearly ten times as much. The latter distributes the solution more perfectly and equally.
 5. Rain immediately after spraying will interfere with success, and the calmer the weather the more evenly and effectively is the solution distributed. Moderate dampness of the crop at the time of spraying is no disadvantage, and better results will be got in dull weather than in bright sun.
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WOOL PRICES IN 1899.

The flockmasters of Great Britain do not appear to have shared in any large measure, if at all, in the upward movement of wool prices which characterised the latter half of the year 1899. This rise was nevertheless so marked in certain descriptions of imported wool as to lead some acknowledged trade authorities to describe the past year as distinguished by a veritable revolution in values. Before altogether accepting this view of the position, it is well to remember that other things besides wool showed some improvement in value last year. The general trade activity of the period is an acknowledged fact, and there is practically no doubt that, broadly speaking, the prices of the great majority of commodities, other than grain, moved very distinctly upwards during 1899. Indeed the compilers of what are known as "Index numbers" agree in pointing to the close of the year as establishing something like an average advance of 12 or 13 per cent. all round within the twelve months, representing a return to a general level of values approximating those of the latter part of 1891.

Some part therefore of the rise in wool prices was probably indirectly the result of this general movement, but some more exceptional factors must have been at work to have produced the more specific changes not thus accounted for. The widely accepted tables, in which the *Economist* newspaper annually endeavours to sum up the typical price movements of the leading commodities of British trade, quote "sheep's wool," in general terms, as standing on the 1st January, 1900, not merely 12 per cent., but nearly 44 per cent. above the price quoted on the 1st January, 1899, and still more largely above the quotations of the opening day of any one of the six preceding years. The figure thus referred to can

hardly, however, be called an average. It is believed to rest only on the mean of three separate quotations of wool prices, two Colonial and one English, being deduced from a comparison of the prices of what is described as good Victorian scoured, superior Cape scoured, and English South Down wool, and no doubt it may be a question for experts whether the selection is sufficiently typical. Certainly such an advance would not have been established if other sections of our wool supplies were equally included in the purview. Even limited to the market values of the three wools named, a little enquiry shows that the rise was 50 per cent. in the two Colonial grades, but under 28 per cent. in the English variety quoted, and, whatever may have been the practice at one time, it is probably no longer safe to take South Down wools as typical of our home produce generally, and the increase of from $9\frac{1}{2}$ d. to $11\frac{1}{2}$ d. per lb. in this section was probably much greater than the whole transactions of the year would have shown. Moreover such rise as there seems to have been came so late in the year that a considerable bulk of the home clip of Down wool must have passed from the producers' hands before the advance occurred. All these considerations lessen the full effect of the rise even in finer varieties of Down wool, when they eventually did move, as a consequence of the diminished supplies of the merino varieties of imported wool which were assiduously run after in the past season.

There are not, perhaps, available any very exact estimates of the relative bulk of the wool of the various breeds of the United Kingdom, and there are certainly no public or authoritative records of the prices which they respectively secure, or even of the average value of British wool as a whole, like those by which we can measure the average price of British grain. Speaking broadly, we know, as was shown some years ago in this Journal,* that of the 12lbs. of wool assumed to be used in a year by each unit of our population, only about 3lbs. is home grown at all, and both the 9lbs. of foreign or colonial produce and the 3 lbs. of domestic production embrace under the common term of "wool" an almost

* Vol. III. No. 2. 1896.

infinite variety of different staples, valued at a widely varying range of prices, from the coarsest fibres at a few pence per lb. to those fine merino imports in which the recent rise was conspicuous, and which changed hands at two shillings and ninepence per lb. before last year was over. Thus, wool values are not only the values of altogether different staples, but the values of staples the demand for which is far from uniform or continuous one year with another, being in no small degree swayed by fashion. It is thus not easy to arrive correctly at a figure which could be confidently declared to represent the mean price of the three most distinctive groups of Australasian, African, or British wool.

Confining the inquiry for the moment to the latter only, it has been customary to quote certain varieties as covering the range of our native wools; and, following this practice, the average of the available weekly quotations of 1899 is certainly very far from reflecting an absolute rise of any sort. For the whole year an average price would actually work out lower than has been shown in any year of the preceding twenty. Leicester wool at 7d. to 8d. per lb., half-bred at 7d. to 8¼d., Lincoln at 7¾d. to 8¾d. (or 8¼d. for "half-hog" wool), or white Cheviot at 6½d. to 9¼d., are one and all below any recent annual averages, and if Southdown wool be quoted as covering transactions stretching from 7¾d. to 11d. per lb., this wider range of values still falls, at the lower quotation, below any recent records, and at the higher limit it only just overtops the similar quotations for 1897 and 1898; and the five prices enumerated must be held to represent no inconsiderable section of the estimated home clip of the season, which the *Bradford Observer* places at over 140,000,000 lbs.

Not very dissimilar to these British figures is the annual average of 7¾d. per lb., at which, in 1899 as well as in 1898, the 87,000,000 lbs. of our wool importations from South Africa was valued. It is not until we examine the Australasian total, which, although smaller on the year, no doubt still constitutes three-fourths of our whole imports, that we find that the initial value of 8·36d. per lb. in January rose to over 9d. in July, and ultimately finished at 11·68d. per lb. in December. By the result of that gradual movement for Australasian

imports, the annual level of 8d. to 8 $\frac{3}{4}$ d., which prevailed for six consecutive years, was broken by a rise to 8·91d., or within a fraction of the full 9d. per lb., which this quota of our supplies last averaged in 1892. But even this rise, which the Customs valuation reveals, is only one of one halfpenny per lb. over the 1898 average, and means no more in the aggregate than an advance of under 6 per cent.

Measured, not by the average but by the changes in the level of prices at the beginning and the end of the twelve months, both Leicester and half-bred English wools appear from the weekly tables of the *Economist* to have begun the year at no more than 7d. per lb., and to have been quoted even a halfpenny below that figure from the beginning of July to the end of November, and only for the last six weeks of the year to have risen to 8d. to 9 $\frac{1}{2}$ d. or 10d. per lb. The South Down values, which began the year with quotations similar to those at which the other sorts left off, began to rise earlier in the autumn, and were quoted as ranging from 9d. to as much as 1s. 2d. per lb. in December. Lincoln wools, to which a temporary change of fashion in favour of "lustre" goods lent a slight and temporary "boom" in 1895-96, experienced in the past year very little improvement from the low level to which they had again relapsed, for although the price for hog wool touched 9 $\frac{1}{2}$ d. in December, and for wether wool 8 $\frac{1}{4}$ d., the belated rise was not enough to lift the year's average value from the minimum record above quoted.

It is obvious, therefore, that such growth as there was of wool values in 1899 only materially affected the higher grades in the market. And this is nearly as true of the imports as it is of the domestic clip. The best types of merinos may, as the trade reports show, have been 60 per cent. higher in December than in January, 1899, and, in a few instances, the better cross-bred wools shared in their prosperity, but the coarser Australasian and other imported cross-bred varieties, the proportion of which in our yearly supply steadily increases, have hardly fared much, if at all, better than the ordinary English wools. The lesson of the year, apart from the perennial one of possibility and of hope enforced by seeing a price recovery of any sort, is therefore the old teach-

ing that, in these days of keen competition, safety and success lie more than ever in quality, and increasing danger lurks in reliance on the ever augmenting out-turn of mediocre grades of produce with which all the world can supply our market.

Thirty years ago the annual average values, quoted in the older volumes of the Agricultural Returns, for Australasian, South African, and English wool, left all three descriptions pretty much on a level, not varying widely from 1s. 3d. per lb. In 1873, when exceptional values prevailed in this country, the only English description quoted was South Down wool, which appeared to have averaged 1s. 11d. per lb., a figure from which it dropped again to a minimum of 1s. 1d. per lb. in 1879, while the Australasian varieties remained for the whole decade, 1869-1879, at a level which ranged only from a minimum yearly average of 1s. 2½d. to 1s. 4¾d. per lb. In 1880 the yearly averages of both South Down and Lincoln wools on the one hand, and of Australasian and African wools on the other, all ranged within the narrow limits of 1s. 2½d. and 1s. 3¼d. per lb. But never since the earliest years of the eighties have either English or colonial wools shown such good average prices as these, whatever exceptional figures may for short periods have been quoted for particular qualities.

It is thus interesting to note in what sorts of wool the higher values quoted in December last once again show some approach to the prices of the 1880 period. Messrs. Helmuth, Schwartze, and Company's Annual Report quotes the following as the cost per lb., clean, of a few representative descriptions of imported wool, at the extreme points of rise and fall in this interval :—

Date.	Port Philip — Good.	Adelaide. — Average.	Buenos Ayres — Average.	Cape — Short Washing.	Australasian Cross-bred.		
					Fine	Medium.	Coarse.
April, 1880	d. 37	d. 34	d. 28½	d. 25	d. 27	d. 22½	d. 22
February, 1895	16½	14½	12½	11½	16	12½	11½
December 1899	33½	31	26½	24	25	16	12½

These data make it appear that as regards merino wools the recent advance from the lowest point of depression in 1895 amounts to over 100 per cent., and almost restores the level of 1880. The recovery in cross-bred wools has been naturally smaller, being about 50 per cent. for the best, under 30 per cent. for the medium, and less than 10 per cent. for the coarser class.

Limited therefore in extent as these changes are, they are none the less significant of movements which our own sheep farmers cannot afford to ignore. Year by year since 1894 our statistics have indicated the material reduction in the large flocks of Australasia under the influence of repeated droughts. In less than a quarter of a century these British colonies had raised their sheep stock from 51,000,000 to 124,000,000 in 1891, but very soon after that date a material shrinkage set in, leaving the total little, if at all, over 100,000,000 at the latest date. This has been in some measure reflected in diminished imports from these colonies, our total receipts from Australia last year falling to 427,000,000 lbs., compared with 448,000,000 lbs. in 1898, and with an average of 503,000,000 lbs. in the four preceding years.

The recently growing South American supplies and those from the Cape have both also shown some check in 1899 as compared with 1898; while still more important than the smaller volume of recent arrivals from the countries which have been the source of our merino imports has been the steadily continuous change in their character, owing to the displacement of the pure merino breeds by the heavier cross-bred varieties of sheep better adapted for mutton production. The *Bradford Observer* adopts the following significant estimates of the proportion of merino to cross-bred sheep in the Colonies and the River Plate at the undermentioned dates:—

		Cross-bred.	Merino.
1888	- - - - -	17.7 per cent.	82.3 per cent.
1892	- - - - -	19.6 „ „	80.4 „ „
1897	- - - - -	39.6 „ „	60.4 „ „
1898	- - - - -	44.6 „ „	55.4 „ „

The effect of these more or less gradual changes, however, hardly appears to have been adequately appreciated

on the wool market of this country until part of 1899 had run its course, and it is stated that "the price of merino tops was practically the same at the beginning of 1899 as it was at the beginning of 1896, the lowest point having been reached in July, 1897." In this delay in recognising scarcity may be found an explanation of the rebound when the pressure of short supplies was realised and of the rapid rise in price which has been noted; while it was not until the movement in merino wools had proceeded for some time that signs of sympathy were apparent in other wools. Eventually, however, the movement in some degree spread to those varieties which most nearly approached the merino in quality, their improvement being, says the authority just quoted, in exact proportion to the nearness of the approach. The English wool producer cannot but usefully recall the warning, which has been given him on more than one occasion of late, that the character of the colonial and foreign competition is itself changing from year to year, with results which flood the market with sea-borne cross-bred wool, of which so very large a share of the home production now consists.

CARRIAGE OF MILK BY RAIL.

The Board of Agriculture, having received representations that considerable uncertainty exists as to the practice of railway companies in permitting milk to be consigned by rail in sealed or padlocked cans at what are known as the "reduced" milk rates (provided that the tare weight of the cans be stamped upon the outside of the can), consider it desirable to publish the following copy of correspondence which has passed between their Department, the Board of Trade, and the Railway Companies' Association.

I.

From Assistant Secretary, Board of Agriculture, to Assistant Secretary (Railway Department), Board of Trade.

20th May, 1899.

Sir,—I am directed by the Board of Agriculture to state, for the information of the Board of Trade, that, in the course of the proceedings on the Sale of Food and Drugs Bill, it has been represented that considerable hardship arises by reason of the prosecution of milk producers in cases in which milk is proved to have been pure when handed over to a railway company for conveyance to the consignee, but is found upon arrival at the station of destination to have been adulterated.

The Board are informed that, except in cases in which rates in excess of those usually charged for the conveyance of milk are paid, it is the practice of the railway companies to require that milk-churns delivered to them for conveyance by rail should be unlocked, and the consignor is therefore unable to take any precautions to prevent persons, whether in the employ of the company or not, from having access to or from tampering with the milk while it is in the charge of the company, although he still remains liable to prosecution should the milk be adulterated in transit.

The Board desire me therefore to invite the observations of the Board of Trade on the subject, and to inquire whether in their judgment it would be feasible to provide any remedy for the complaints referred to.

I am, &c.,

(Signed) P. G. CRAIGIE.

II.

*From Assistant Secretary (Railway Department), Board of Trade,
to Secretary, Board of Agriculture.*

17th October, 1899.

Sir,—Adverting to your letter of the 20th May last with reference to the regulations of Railway Companies respecting the conveyance of milk, and to the question of the liability to prosecution in the event of milk being adulterated in transit, I am directed by the Board of Trade to transmit herewith for the information of the Board of Agriculture a copy of a letter which has been received from the Railway Companies' Association on the subject.

I am, &c.,

(Signed) FRANCIS J. S. HOPWOOD.

Enclosure.

*From Railway Companies' Association, King's Cross Station, to
Assistant Secretary, (Railway Department), Board of Trade.*

October 12th, 1899.

Sir,—With reference to your communication (No. R 7,352) of the 29th May last, enclosing a copy of a letter dated 20th May from the Board of Agriculture, with regard to the regulations of the railway companies for the conveyance of milk, and to the question of the liability to prosecution in the event of the milk being adulterated in transit: The railway companies have considered the question, and I am requested to inform you with reference to the statement made in the letter from the Board of Agriculture, that senders have for a long time been allowed to send milk in sealed cans, the companies accept the declaration of the senders as to the quantity conveyed, no extra charge being made; the only condition the companies require to be fulfilled is that the tare

weight of the cans shall be stamped upon the outside of the can, so that in case of doubt the quantity of milk within the churn can be approximately ascertained by allowing 10 $\frac{1}{4}$ lbs. for each gallon of milk declared.

It does not appear to the companies that there is any difficulty in the senders protecting themselves against alleged loss of milk in transit by sealing, padlocking, or otherwise fastening their cans.

I am, &c.,

(Signed) H. OAKLEY.

III.

From Assistant Secretary, Board of Agriculture, to Assistant Secretary (Railway Department), Board of Trade.

9th November, 1899.

Sir,—Adverting to Mr. Hopwood's letter of the 17th ult (R. 12,901), and to the enclosure from Sir Henry Oakley on behalf of the Railway Companies' Association, I am directed by the Board of Agriculture to inquire whether they may understand from Sir Henry Oakley's letter that sealed or padlocked milk cans are as a matter of fact conveyed by the railway companies at the *reduced* milk rate (at owner's risk), provided that they are stamped with the tare weight of the cans, and that Section 8 of the Companies' Conditions of Carriage does not apply to such cans.

With reference to the concluding sentence of Sir Henry Oakley's letter, viz., that it does not appear to the companies that there is any difficulty in the senders protecting themselves against alleged loss of milk in transit by sealing, padlocking, or otherwise fastening their cans, I am to point out that the published conditions of the Great Northern railway contain no provision relating to sealed cans, but on the contrary state specifically (Section 8) that the company shall have power to open any cans, a condition that appears to preclude their being securely fastened.

I am, etc.,

(Signed) P. G. CRAIGIE.

IV.

From Assistant Secretary (Railway Department), Board of Trade, to Secretary, Board of Agriculture.

24th November, 1899.

Sir,—With reference to Major Craigie's letter of the 9th instant respecting the conveyance of milk by railway companies, I am directed by the Board of Trade to transmit herewith, for the information of the Board of Agriculture, a copy of correspondence which has since taken place between the Railway Companies' Association and the Board of Trade on the subject.

I am, etc.

(Signed) T. H. W. PELHAM.

Enclosure No. 1.

From Railway Companies Association to Assistant Secretary (Railway Department), Board of Trade.

November 15th, 1899.

Sir,—With reference to your letter (No. R. 13, 936) of the 14th instant and the communication from Mr. Craigie which accompanied it, respecting the regulations of the railway companies for the conveyance of milk, and the question of liability to prosecution in the event of milk being adulterated in transit, I made enquiry before I replied to your letter dated May 20th, and was informed that, as a matter of fact, the railway companies did convey milk in sealed cans, provided they were stamped as required by Clause No. 4 of the railway companies' regulations.

With regard to Clause No. 8 of the regulations, the meaning is obvious that if there are reasonable grounds for believing that a can contains a greater quantity of milk than that invoiced, the companies in such cases reserve to themselves power to open the can to ascertain that the quantity therein contained agrees with the quantity declared. It is simply a protective clause there is no reason to exercise if the milk be honestly declared.

I am, etc.

(Signed) H. OAKLEY.

Enclosure No. 2.

From Assistant Secretary (Railway Department), Board of Trade, to Railway Companies' Association.

20th November, 1899.

Sir,—I am directed by the Board of Trade to acknowledge the receipt of your letter of the 15th instant, in reply to the letter from the Board of Agriculture of the 9th instant, respecting the regulations of the railway companies for the conveyance of milk.

I am to state with reference to the first paragraph of your letter that the Board of Agriculture also appear to wish to know if any difference is made in the rates charged for the conveyance of milk when the milk is sent in sealed or pad-locked cans.

With regard to the second paragraph, I am to enquire if the Board of Agriculture are to understand that the companies reserve to themselves power to open sealed or pad-locked cans, though according to your letter of the 12th ultimo when the tare weight is stamped upon the outside of the can the quantity of milk inside could, in case of doubt, be approximately ascertained by allowing $10\frac{1}{4}$ lbs. for each gallon of milk declared.

I am, etc.

(Signed) FRANCIS J. S. HOPWOOD.

Enclosure No. 3.

From Railway Companies' Association to Assistant Secretary (Railway Department), Board of Trade.

November 21st, 1899.

Sir,—I am in receipt of your letter of the 20th instant (No R. 14,232) respecting the communication from the Board of Agriculture on the subject of the regulations of the railway Companies for the conveyance of milk. I am informed by all the principal railway companies that they do not make any difference in the charges when sealed cans are used.

The companies *do* reserve the right to open locked cans when there is any reasonable doubt as to the accuracy of the consignment.

I am, &c.

(Signed) H. OAKLEY.

AGRICULTURAL AND MISCELLANEOUS NOTES.

AGRICULTURAL HIRINGS IN SCOTLAND.

The Labour Department of the Board of Trade has published in the *Labour Gazette* information received by the Department relating to the rates of wages obtained by farm servants at the yearly and half-yearly hiring fairs which took place in Scotland during the last six months of 1899 in the counties of Aberdeen, Argyle, Ayr, Banff, Berwick, Caithness, Clackmannan, Dumbarton, Dumfries, Edinburgh, Elgin, Fife, Forfar, Haddington, Inverness, Kincardine, Kirkcudbright, Lanark, Linlithgow, Nairn, Peebles, Perth, Renfrew, Ross and Cromarty, Roxburgh, Selkirk, Stirling, and Wigtown.

Generally speaking, there was but little change in wages compared with the corresponding period in the previous year. At the earlier autumn fairs, notably in the counties of Forfar and Perth, a rise of about 20s. for the year was paid, but as the hiring season advanced wages are said to have returned to their former level. As a rule, men who remained in their places got their old wages. In a few cases men who changed had to take from about 10s. to 20s. less for the half-year, and this is said to have been due to the fine weather in the autumn, which enabled farmers to get field work exceptionally well advanced.

Women servants were generally scarce, and their wages frequently increased from 10s. to 20s. for the half-year.

The wages of first and second horsemen at the yearly hirings in the counties of Fife and Kinross were from £26 to £33, and of third horsemen from £24 to £29. The half-yearly wages of first and second horsemen were generally about £13 to £18 in the counties of Aberdeen, Banff, Elgin, Forfar, Inverness, Kincardine, Lanark, Nairn, and Stirling. Married

men in addition to their cash wages usually get free cottages and allowances of oatmeal, milk, potatoes, and perhaps coals, or coals carted free, and unmarried men get their board and lodging except in the Border Counties and the Lothians, where the system prevails of engaging families by the year.

In most cases unmarried men who are lodged and fed by their employers are hired by the half-year, and married men living in cottages (and with these are generally included shepherds and men in charge of cattle and the head ploughmen) are engaged by the year. But there are many exceptions ; in some districts the engagements are half-yearly for all classes, whether married or single, in others yearly, in others a mixed system.

In the Border Counties and in the Lothians most of the farm servants are hired by the year, and live in cottages on or close to the farm. They are usually hired by families, the sons and daughters living at home with their parents and working together on the same farm, the men receiving an "upstanding wage," and the women being paid so much a day when they present themselves for work. In most of these counties there are districts where unmarried men are hired by the year and half-year, and are lodged and boarded by their employers. In other parts of Scotland the proportion of the unmarried men hired is usually larger than that of the married men, but the number of married men that a farmer can engage depends on the cottage accommodation at his disposal, as they are always provided with cottages on the farm, the English village system being practically unknown.

Several systems for lodging and boarding unmarried men are in existence. Frequently they are lodged and boarded in the farmhouses, but in some in the houses of the married men. Another system is to lodge them in a bothy and provide food for them either in the kitchen or in the bothy, but in some instances the men lodging in a bothy find and prepare their own food. In the last case they usually receive a certain allowance of meal and milk, and sometimes potatoes.

YELLOW BLIGHT OF POTATOES.

The Congested Districts Board for Ireland have prepared information, for the use of their agricultural inspectors and instructors, concerning the stalk disease (*Peziza postuma*) and the root-rot fungus, which are associated with the appearance of the "yellow" blight of potato plants.

It is stated that in many cases, more particularly in the west of Ireland, the potato leaves turn yellow long before the normal time when the plants die down; in some kinds, for instance, which should last till the end of September, the leaves turn yellow or are quite gone at the end of July. This early yellowing is a sign of disease, and plants with such leaves do not give their full yield of tubers.

On the underground parts of such plants fine branching threads may be seen, particularly with a magnifying glass. These threads are part of a fungus which attacks the plant underground, both inside and outside, and prevents the roots from doing their work—that of taking up from the soil the water and mineral matter needed by the plant. The fungus also attacks the roots of all kinds of weeds in the potato plot, and in this way creeps more easily from a diseased potato plant to a healthy one, and facilitates the spread of the disease.

The same potato plant with the yellow leaves and the root fungus is often found suffering from the "stalk" disease, in which the stem, either just above the ground or throughout a large part of it, is no longer green, but white, dry, and hollow. The decay of the stem causes it to topple over, and a badly infected plot will at times appear as if the plants had been trodden down.

When the roots die, little black swellings—sclerotia—are found on them, and similar swellings may also be found on the leaves, stalks, or tubers. The decaying leaves often also have little greyish-white tufts of easily detached spores, or "conidia," upon them. These sclerotia serve to preserve the fungus from one year to another, while the conidia also help to spread the disease.

The difficulty of stamping out the yellow blight is increased

by the fact that the disease attacks the many different kinds of weeds in the potato beds; hence all weeds growing with the crops should be pulled up and burned. The remedial measures recommended consist chiefly in cutting away and burning all affected parts, as well as the roots, stalks, and decaying leaves which remain after the crop has been removed, care being taken not to let the sclerotia fall to the ground. A heavy dressing of lime, especially in peaty land, is said to be an advantage, with deep trenching and good drainage and aeration. As a preventive measure the Congested District Board recommend the steeping of seed tubers, if any suspicion attaches to them, in a half per cent. solution of copper sulphate before they are pitted.

THE MANURING OF CLOVER HAY.

An account has been received by the Board of Agriculture of the results of an experiment conducted during the past year under the direction of Professor Campbell, B.Sc., of the Yorkshire College, Leeds, to ascertain the effect on clovers of certain manures which in some parts of the country are commonly applied to "seeds." The experiment was carried out at the Manor Farm, Garforth, and on land at Driffield, Bridlington, and Pocklington. At Driffield and Bridlington the soil is on chalk, and both fields are liable to what is known as clover sickness, *i.e.*, land on which red clover does not grow freely when sown once in four years. The soil at Pocklington was on the light drift of the vale of York, that at Garforth was a medium loam. At the latter place it was found that the clover grew successfully without the aid of any top dressing, and the results were therefore less affected by the manures than at Driffield or Pocklington.

The fields under experiment had been sown for the most part with mixtures of red clover (in some cases called cow grass), alsike clover, white clover, trefoil, and in one or two cases a small proportion of rib grass, together with 2 or 3 lbs. of rye grass.

The manures employed and the quantities applied per acre were as follows :—

Kainit 5 cwt., sulphate of potash 140 lbs., muriate of potash 120 lbs., sulphate of ammonia 1 cwt., nitrate of soda 144 lbs., and basic slag 4 cwt. At each centre these manures were tried separately on six of the experimental plots. On three additional plots the basic slag was combined with 2 cwts. per acre of muriate of potash, the combination being applied alone on one plot, and on the remaining two plots with sulphate of ammonia (1 cwt. per acre) and nitrate of soda (144 lbs. per acre) respectively. A plot at three of the centres was also devoted to a trial of "nitragin," a preparation sold for the inoculation of the soil with the organisms that inhabit the nodules on the roots of clover and other leguminous plants. Owing to the dry season the influence of the manures was to a large extent minimised; and of the four centres, the results obtained at Driffild are considered the most valuable. There the land was very uniform, and the manures had a more marked effect in changing the botanical composition of the crop than at any other centre.

From a summary of the general results of the experiment, it appears that all three forms of potash increased decidedly the yield on the chalk at Driffild. At mowing time there was a striking difference between the appearance of the potash plots and the others. Potash greatly favoured the development of red clover, which suppressed to a large extent the yellow trefoil.

Sulphate of ammonia and nitrate of soda had no marked effect upon the yield of clover.

Basic slag, when used alone, appeared to reduce, rather than to increase, the crop. A mixture of 4 cwt. basic slag and 2 cwt. muriate of potash yielded a substantial increase, and a somewhat similar mixture can be recommended for application to clover-sick land. The addition of either sulphate of ammonia or nitrate of soda to a mixture of basic slag and muriate of potash yielded very little better results than a mixture of basic slag and muriate of potash alone. Nitragin did not increase the crop.

AGRICULTURAL SCHOOLS IN RUSSIA.*

Agricultural education in Russia, which until recently does not seem to have been in a very active condition, has during the past decade received considerable attention from the Ministry of Agriculture, and since M. Yermolow's accession to that post a fresh impetus has been given to the institutions affording instruction of this nature. The two superior schools of agriculture have been completely reorganised by him, their scope and teaching staff being enlarged, and additional pecuniary means being placed at their disposal. Other agricultural schools, also, while not being subjected to the same important changes, are nevertheless being developed, and their number is largely increasing.

General agricultural schools in Russia may be divided into three categories: higher, intermediate, and lower. The higher instruction is provided—apart from such institutions as the “Polytechnic” at Riga, which has an agricultural side, and from lectures on vine cultivation at Yalta, etc.—in two “High Schools,” one at Moscow, and the other, the New Alexander Institute, in the Government of Lublin, not very far from Warsaw. The first of these, prior to its reorganisation in 1894, was known as the Petrowsky Institute; and the latter, remodelled in 1893, as the Alexander Academy. The instruction at both these schools lasts four years, and both are well equipped with experimental fields, etc. The Moscow High School takes 200 students, and has 1,600 acres of land attached to it, of which some 630 acres are forest and 530 farming land. The New Alexander Institute takes 250 pupils, and has a total of 4,000 acres, nearly half of this being forest and 1,600 acres farming land. Provision is made, as far as possible, for practical work of varied character, but it would seem that this is as yet not very thorough, and the instruction is at present looked upon as too purely scientific. Degrees—carrying the title of agronome—are granted after examination at the end of the course, but only when the pupils have satisfactorily performed a half-year's practical work upon a farm.

* From the *Mitteilungen der Deutschen Landwirtschafts Gesellschaft*, No. 18, 1899, Supplement.

A large number of public situations are open to these graduates, and many seek places under Government. There are numerous posts under Government or local authorities throughout the empire; they can enter the service of the agricultural societies, of which there were in 1898 about 170 (with some 125 branches); or they may be able to obtain a post in the Ministry of Agriculture and Domains.

The intermediate agricultural schools, which have not been subjected to any material reorganisation, are seven in number, situated at Sorki (Mohilew), Kazan, Kharkow, Marinowka, Moscow, Uman, and Kherson. There is also one similar viticultural school. Their object is mainly the training of practical bailiffs, etc., and of teachers for the lower schools. Each has a farm, varying in extent from 370 to 1,800 acres. The teaching is so arranged as to be chiefly theoretical during the winter months and practical during the summer. The whole course is of six years' duration, but many of the pupils stay for only one or more years, as they frequently obtain employment before completing the course; for instance, the number of students in their sixth year were, on the average of the three years 1894-6, one quarter of those in their first year at the Moscow School, and a little over half at Kharkow. There are also special courses at some of these schools, *e.g.*, on land valuation at Sorki, on wool grading and on teaching at Kharkow. The total number of pupils at all these intermediate schools was 1,436 in 1897.

The lower agricultural schools, of which there were 73 in 1894, have considerably increased of late, and numbered 109 in 1898. Apart from four State schools, which have long been in existence, they are all founded and conducted in accordance with the "Normal Regulations" of 1883. There are thus first and second grade schools, as well as some of a more elementary character under the supervision of the officials of the Steppe districts. The course lasts three years, to which one year's practical work is added. The schools either have their own farms, or are able to make use of estates belonging to public bodies or individuals. The aim of these lower schools is to prepare the students as practical under-bailiffs, etc., while the more elementary Steppe schools

are of a more general character, and are intended to give the Khirgiz some acquaintance with the Russian language and methods of farm work. There are further 19 horticultural and viticultural schools for educating the young men as gardeners, vine growers, etc.

Besides the general schools enumerated in the above three categories, there were in 1897 ten dairy schools, all founded since 1890, with a course lasting one year, followed by a year on a suitable farm. There is also a school for agricultural handicraftsmen, and one for shepherds. Three girls' schools, with 147 pupils, commenced operations in 1897, instruction being provided in domestic economy and suitable farm work.

Of special forestry schools in Russia there are 30. These are lower schools (replacing some of an intermediate character), and men desirous of becoming forestal officials are required to pass through such a school. They take boys from 14 to 16 years of age, and the course lasts two years. They are all connected with a forestal district, of which the "ranger" at the same time conducts the school. During the two winter terms the students receive theoretical instruction, and are occupied in practical work during the summer. Each school rarely takes more than twenty pupils, of whom ten may be in receipt of State scholarships.

Higher education in forestry is provided by (1) the St. Petersburg Forestry Institute, under the control of the Ministry of Agriculture, and (2) by the New Alexander Institute of Agriculture and Forestry, already referred to, in connection with the Ministry of Public Instruction. Both are somewhat restricted as to accommodation for pupils, especially the latter, where the greater number of students are following the agricultural classes. The usual course lasts four years, and includes practical work.

The cost of the agricultural schools in 1897 was about £230,000, of which, in round figures, £158,000 was contributed by the State, £25,000 by the Zemstvos (local authorities), and £47,000 by the students. These amounts do not include the expenses of the forestry schools.

POULTRY FATTENING EXPERIMENT.

During the months of October and November, 1898, an interesting experiment was conducted by the Poultry department of the Canadian Experimental Farm in the fattening of thirty-six young fowls by natural feeding and without artificial cramming. Among the 36 fowls were eight barndoor chickens and four cockerels of a first cross between light Brahma and buff Cochin, the cockerels were probably hatched about the same time as the barndoor chickens, but were nearly double their weight. The remaining fowls consisted of barred and white Plymouth Rocks, light Brahmas, silver-laced and white Wyandottes and four crosses of white Indian Game with white Java. The birds were fine specimens, some of the Plymouth Rocks and Light Brahmas weighing six and six and a half pounds each. The fowls, which were divided into nine groups of four each, were placed in suitable fattening pens with a narrow trough in front, and were fed three times daily on rations composed of two parts of finely ground oatmeal, one part finely ground barley meal, and one part ordinary corn meal. After the fifteenth day, beef-suet, in the proportion of one ounce to each group, was added to the ration; the whole being mixed with sweet milk made hot. Of this ration the birds were given all they would eat, no forcing machines being used. Without giving all the details of the experiment, which extended over five weeks, the general results may be shown by the increase in the weight of certain of the fowls.

The two sets, each composed of four barndoor fowls, which weighed respectively on entering the fattening pen 14 lbs. 5 ozs. and 19 lbs. 1½ ozs., showed an increase at the end of five weeks of 6 lbs. 3½ ozs. and 5 lbs. 9½ ozs. respectively, or an average of about 1½ lbs. per fowl. Four barred Plymouth Rocks, weighing 23 lbs. 12 ozs. when they went into the pen, at the end of five weeks weighed 30 lbs. 4 ozs., making a gain in that period of 6 lbs. 8 ozs. The barnyard chickens consumed food to the amount of 36 lbs., and the Plymouth Rocks consumed about 1 lb. more. The most satisfactory results were obtained from the four fowls of the light Brahma-

buff Cochin cross. Their weight on entering the fattening pen was 25 lbs. $3\frac{1}{2}$ ozs., and after five weeks they scaled 33 lbs. $6\frac{1}{2}$ ozs., an increase of 8 lbs. 3 ozs. The food consumed by this lot weighed 39 lbs. $7\frac{3}{4}$ ozs.

In the opinion of the poultry expert, the results of this experiment show that the question of the breed of the fowls is very important in poultry fattening; and that if the rapid flesh forming breeds, such as Plymouth Rocks, Wyandottes, Brahmas, and Cochins are properly kept and properly fed for three or four weeks previous to being killed, no forcing or cramming by machine is necessary.

BREEDING AND FEEDING CANADIAN BACON PIGS.

The Annual Report of the Ontario Bureau of Industries for 1898 contains some useful observations, which may be of interest to breeders in this country, on the type of pig which Canadian bacon owners engaged in the export trade to the United Kingdom find most profitable. Formerly it was the aim of every breeder in the Dominion to produce big, fat hogs, but in order to meet the requirements of consumers in the mother country a revolution has been effected in the character of Canadian swine. The points now sought for are great length and depth with a corresponding decrease in width of back, light shoulders and jowl, and fleshiness rather than fatness. The breeds which are regarded as most suitable for the production of bacon for British markets are Yorkshires and Tamworths, while Berkshires and Chester Whites are also recommended. For feeding purposes cross-bred swine are stated to give better results than the pure bred, particularly Yorkshire-Berkshire and the Tamworth-Berkshire crosses.

The economical feeding of pigs has always received considerable attention at the Canadian experiment stations, but until recently the experiments have been directed mainly to the determination of the cheapest methods of feeding, irrespective of the quality or firmness of the meat produced.

Investigations are now being made at the Guelph and Ottawa stations to discover the best rations for the production of bacon. One important result brought out by the trials so far as they have gone is the unsuitability of maize when given throughout as the sole or principal ration to bacon pigs, though maize meal has been used for finishing off with success at the Guelph station. But while the kind of food fed to the hog during the finishing-off period is recognised as having a most important influence on the quality of the flesh, it has been found that the firmness or softness of the bacon also depends largely upon the character of the rations given previous to the fattening period. The grains which Canadian pig-keepers are recommended to avoid, or to use sparingly, are beans, buckwheat, and rye, all of which are said to be prejudicial to the production of good bacon; but it must be observed that the Canadian beans are a different variety from those grown in this country. Rape, grass, and clover are also considered to have a detrimental effect on the quality of the meat when given too abundantly to pigs in the fattening stage.

Among grains mentioned in the report as serviceable in the final development of bacon hogs the first place is given to barley, whether fed alone or in combination with other grains, such as peas, wheat, oats, maize, and shorts. Reference is also made to the value of shorts and middlings as a food for both young and older pigs. Peas, on account of the large amount of protein they contain, are stated to make an admirable adjunct to other grains in the feeding of swine, especially when fed ground, although they have given good results where they have been fed whole, after having been previously soaked for some hours. The great value of dairy by-products as part of the rations for fattening swine has been proved by numerous experiments in the Dominion. The report states that there is practically no difference in the feeding value of skim-milk, butter-milk, or whey, when all three are fed in prime condition. Mention is also made of the use of molasses, potatoes, roots, bone-meal, and wood-ashes. With regard to molasses, it is stated that, according to an

experiment conducted in Germany, this food can with advantage be mixed with barley in equal proportions, or in the proportion of two parts of barley to one of molasses. The use of small quantities of bone meal and of hardwood ashes has been found to produce very beneficial results in the case of pigs fed on maize meal, the quantities used per week being about three-fifths of a pound of bone-meal, or about two pounds of ashes. Cooked potatoes, mangolds, and carrots are also said to be profitably used with grain without any injurious effects on the bacon.

AGRICULTURE IN SOUTHERN ITALY.

In his Consular Report on the trade of Southern Italy for 1899, Mr. Consul Neville Rolfe states that the harvest in the past season was good over the greater part of Italy, this leading to a considerable reduction in the imports of grain. Italian agriculture would, it is thought, greatly profit by better cultivation, more capital, and especially co-operation. In this connection Mr. Neville Rolfe considers that the best scheme hitherto proposed has been the creation of a central Chamber of Agriculture in Rome, under the control of Parliament, with 1,800 local centres scattered all over the country. These local centres should absorb the numerous small societies formed for the encouragement of the various branch industries which come under the definition of agriculture.

A considerable extension of the acreage under sugar-beet is contemplated. Hitherto this cultivation and the erection of sugar refineries have been confined to the northern portion of this consular district, but it is now proposed to grow the crop largely in the province of Benvenuto, and a company has been formed to erect works on a large scale. Many local landowners have consented to grow the root on what is known in Southern Italy as "subscription of land," by which the landowner stands in the same position as the shareholder who has invested money in the concern. Refiners are stated

to have done well hitherto, owing to the heavy protection, but any modification of the present taxation would, it is believed, greatly curtail the profits.

Among other points of interest noted in this Report is the formation of a dairy company, the cows being obtained from Switzerland, for the production of milk on a large scale from the rich land formed by the filling up of the Lago d'Agnano, not far from Naples.

[*Foreign Office Report, Annual Series, No. 2376. Price 2d.*]

CULTIVATION OF HORSE-RADISH IN BOHEMIA.

Horse-radish is grown on a considerable scale in various parts of Bohemia, and particularly at Kuttendorf, a small village south-west of Kolin, in Bohemia, whence large quantities are exported. The variety of horse-radish known in Germany and Austria as the "Maliner" or "Maliner Kren" is considered superior to any other. It is distinguished by its unusually sharp, penetrating taste, uniform shape, and excellent keeping qualities.

The method of cultivating this variety of horse-radish is described in a circular recently issued by the Division of Botany of the United States Department of Agriculture from notes furnished by Mr. H. Schmidt, of the Agricultural College in Leitmeritz, Bohemia.

According to the latter authority, a deep, loose, strong soil with plenty of moisture is considered the most suitable for the growth of horse-radish. In the autumn the soil is forked over to a depth of two or two and a half feet and well-rotted farm-yard manure is thoroughly worked in to the depth of a foot or more. A narrow bed, three feet wide, is then prepared, and late in March or early in April the horse-radish cuttings are planted along both edges, alternating so that they are not opposite each other across the bed. The cuttings are 12 inches long, and are set out 18 inches apart. Instead of being placed vertically in the ground they are planted in an oblique position, with the upper and larger end covered by

only three-quarters to one inch of earth, while the lower lies three or four inches deep. As a consequence of this slanting position, the new roots thrown out from the lower end of the cutting strike vertically downward, making nearly a right angle with the main stem, and it is from these slender roots that the new cuttings for the next season's planting are made. During the summer the ground is kept free from weeds and the surface of the soil lightly stirred. Towards the end of June the bed is gone over carefully and each cutting uncovered separately and slightly raised out of the soil with the hand. Care is taken not to injure the perpendicular roots which have formed from its lower end. All small rootlets are rubbed off from the body of the root with a woollen cloth, those that are too large to be removed in this manner being cut close with a sharp knife. A small quantity of powdered charcoal is scattered over the cut surfaces to prevent decay, and the cutting is again covered with earth as before. In order to keep the new roots of a uniform diameter, and to prevent their striking deep into the soil and becoming too slender, the beds are sometimes underlaid with a porous cement pavement, a foot and a half below the surface of the ground. This pavement checks the growth of the young roots and causes them to thicken.

The roots are allowed to continue their growth until the end of September, when the harvest begins. The cuttings which have been two seasons in the ground, first as vertical roots and afterwards in the oblique position, are by this time large enough for market. In digging the horse-radish, a long-bladed mattock or spade is used; this enables the digger to remove not only the obliquely planted cutting, which is the marketable product, but also the new roots from its lower end, of which the cuttings for the next year are to be made. The radishes are sent to market in neat bundles of several dozen. The uniformity in length and diameter is remarkable, the average thickness being about $2\frac{1}{2}$ inches at the large end and $1\frac{1}{2}$ inches at the other. Restaurants keep their supplies of horse-radish quite fresh for several months by planting the roots in cool cellars in moist sand, and the cuttings, held over for the spring planting, are kept in the same way.

AGRICULTURAL CO-OPERATIVE SOCIETIES IN IRELAND.

According to the annual report of the Irish Agricultural Organisation Society for the year ended March 31st, 1899, the total number of co-operative associations of all kinds in existence in Ireland at the date last mentioned was 374, with a membership of 36,683 persons. This number included 191 dairy societies, including 38 auxiliary creameries; 99 agricultural societies; 48 co-operative banks; 16 poultry societies; 18 miscellaneous associations; and 2 federations.

Complete returns are furnished in the report of the business transactions of 100 of the dairy societies, exclusive of auxiliaries. These societies received in the year nearly twenty-three and a quarter million gallons of milk, from which they produced 4,177 tons of butter. The farmers were paid an average price of $3\frac{1}{2}$ d. per gallon for milk supplied to the societies, the separated milk and buttermilk being returned to them free of charge. The average quantity of milk utilised in the production of 1lb. of butter was 2.48 gallons, and the average price realised for the butter was 9.83d. per lb. A net profit of £6,176 was earned in the year's trading. Many of the co-operative dairy societies have taken up the business of supplying manures and other farming requisites to their members; some have introduced schemes for the improvement of their members' live stock; while in other cases the production of eggs and poultry and the establishment of agricultural banks have also been undertaken as adjuncts to the ordinary business of butter-making.

The co-operative agricultural societies, which are formed mainly for the supply of fertilisers, seeds, agricultural implements, and other articles used on the farm, numbered 99 in March last, with a total membership of 11,025. The turnover of these bodies amounted in the year to £56,263, but it is stated that their influence should not be measured by their business returns alone, for one result of the establishment of these societies has been to reduce generally the prices of articles used on the farm, not only to their members but also to outsiders residing in districts where the operations of the co-operative associations are felt. Little has been done

hitherto in the sale of agricultural produce by these local organisations, but an important development in this direction has recently been inaugurated by the completion of arrangements for the sale of bacon pigs direct to the curers. The societies collect from their members a sufficient number of pigs to fill one or more railway trucks and consign the animals to the curing establishment. Each member's lot is marked with a number to facilitate identification and paid for according to the dressed weight at the current market values.

The co-operative poultry societies, which were sixteen in number at the date of the report, have been formed both for improving the breeds of fowls and the methods of rearing and fattening them, and for the introduction of a better system of marketing poultry and eggs. The societies purchase eggs from their members by weight instead of by number. So far the business has been mainly confined to the collection and sale of eggs, but some societies have taken up the trade in table poultry.

Another form of co-operation which has made considerable progress is to be found in the agricultural credit associations or loan banks. In March last there were forty-eight banks of this character in operation. No bad debts had been incurred, punctuality in repayment being the rule. In one society in Mayo, the largest in point of membership, where 536 loans were granted, only twelve members were one week late in repayment.

ITINERANT DAIRY INSTRUCTION IN IRELAND.

The appendix to the Report of the Commissioners of National Education, Ireland, contains some observations by Mr. T. Carroll, M.R.I.A., Agricultural Superintendent, on the work done by the female teachers of dairying attached to the Munster Dairy School. The itinerant method of instruction has been adopted in Munster in order to reach the butter producers who are not under the influence of creameries. Skilled instructresses are sent from the Albert Farm

and the Munster Dairy School to places where their services are required upon an application for their services being signed by a committee of at least six farmers, who must undertake to provide, free of charge, a suitable building in which practical instruction can be efficiently given, together with a sufficient quantity of milk or cream. The local committee is also expected to advertise the classes in the district, and to engage a woman to assist the instructress and wash the dairy utensils. In each district, where practicable, a committee of ladies is formed to supervise the classes and see that suitable lodgings are provided for the instructress.

The itinerant dairy classes are stated to be attended mainly by the wives and daughters of farmers occupying small holdings, whose limited means do not allow of any considerable expenditure in improving their dairies or in providing modern appliances. Considerable efforts have been made to bring young girls in dairying districts under this instruction by means of the National Schools, and several religious communities have encouraged this form of instruction by giving their schools for the use of the instructresses, and by stimulating the older girls to take advantage of the opportunity for improving their knowledge of dairying.

In addition to the work done by means of these classes, dairy instructresses are also sent to any district in response to an application signed by at least six farmers, for the purpose of visiting the dairies and giving practical demonstrations in making butter with the utensils, or other simple appliances available, on the premises.

THE MALTING AND SEED BARLEY COMPETITION OF 1899.

The Board of Agriculture have received a copy of the official report of the judges of the malting and seed barley competition held in connection with the Brewers' Exhibition from October 28th to November 3rd last. The number of exhibits of barley entered for the competition was 222,

including 196 English, 3 colonial, and 23 foreign samples; in the previous year there were 173 entries, of which 143 were English.

The English entries comprised samples from 28 counties; the average weight per bushel for the whole was 56·9 lbs., the highest weight recorded was 59 lbs. and the lowest 54 lbs. per bushel. In the class for foreign exhibits, the heaviest sample weighed 58·4 lbs. per bushel, and the lightest 48·3 lbs.

From the particulars furnished as to the date of sowing, it appears that the largest number of prizes was awarded to samples sown in the first week of March. The earliest date of harvesting was July 21st, and the latest August 30th.

The judges express the opinion that great benefit would accrue if exhibits could be arranged by Agricultural Colleges and County and Technical Schools of samples of inferior and defective barleys unsuitable for brewing purposes.

HOLDINGS IN NEW SOUTH WALES.

Excluding land held by the tenants of the Crown, there were in New South Wales, at the end of March, 1898, 65,298 holdings of one acre and upwards in extent. Twenty years previously, such holdings numbered 37,887. The number increased during the period by over 72 per cent., while the area comprised in the holdings advanced from 21,471,596 acres in 1879 to 43,518,921 acres in 1898. Of the number recorded in the latter year, 18,784 were under 31 acres in extent, 33,478 ranged between 31 and 400 acres; 7,623 between 401 and 1,000 acres; and 5,413 exceeded 1,000 acres in extent. In the larger number of cases, the occupier of a holding is also the owner, tenancy having made comparatively little progress.

Of the total area occupied by the holdings, only 1,779,008 acres, or 4·08 per cent., are returned as under cultivation, the largest proportion of cultivated land occurring on the smaller

holdings less than 31 acres in extent, where it amounts to 3·4 per cent., while it decreases as the holdings increase in size, and amounts to only 0·87 per cent. on the farms exceeding 10,000 acres. The comparatively small proportion of cultivated land is explained by the fact that the greater part of the land is used for grazing purposes.

The acreage comprised in the holdings referred to above is for the most part land alienated from the Crown, though it includes in some cases portions of Crown land attached to holdings otherwise owned by private persons. There is, however, in addition to the foregoing, an area of 118,338,798 acres of Crown land, not connected with alienated holdings, occupied by 2,866 persons, so that the total area of land occupied for agriculture and grazing purposes in the Colony is 161,857,719 acres, of which 160,035,890 acres are utilised for grazing and dairying, and 1,821,829 acres for agriculture.

(Wealth and Progress of New South Wales, 1897-98.)

THE INDIAN WHEAT TRADE.

In his review of the trade of British India in 1898-99, Mr. O'Connor, C.I.E., Director General of Statistics, states that the circumstances of that year could not have been better for the Indian wheat grower in Northern India. An excellent harvest was reaped, and just as it was put into the market, and before prices had time to recede to the level of the period preceding the famine year, a wave of higher prices in the consuming markets set in under the influence of speculative action in the United States. Prices subsequently fell owing to the fact that the American supplies of wheat proved to be larger than was anticipated, but before the fall had reached the former level India had exported a quantity much larger than in any year since 1890-1891.

The total exports of wheat from India in 1898-99 and in each of the preceding five years were as follows:—

Cwts.				Cwts.			
1893-94	-	-	12,156,551	1896-97	-	-	1,910,553
1894-95	-	-	6,887,791	1897-98	-	-	2,392,607
1895-96	-	-	10,002,912	1898-99	-	-	19,520,496
				I I 2			

Commenting on these figures Mr. O'Connor states that it was not until the year 1893-94 that, in consequence of indifferent and bad harvests in India, the exports fell to a level not before known since the trade first developed, and that it may be reasonably hoped that, in ordinarily good years, India may on an average export as much wheat as on the average of the years before 1893-94, or more.

In connection with this question Mr. O'Connor observes, however, that from the close attention given to the Indian wheat trade by critics of Indian economics and finance, it might be inferred that they believe it to be the most important part of the trade of the country, and this inference is strengthened by the persistency with which attention is drawn to the fact that there has been no real increase in the export price of wheat. The fact is usually ignored, he continues, that the export price of rice has increased by more than 50 per cent., and that the trade in that grain is of far greater importance than the trade in wheat, as regards both quantity and value. Internally, too, the cultivation of rice is of much greater importance. The area under wheat is only a third of the area under rice, the harvest yield is about a fifth of that of rice, and for one person in India who habitually eats wheat at least five persons habitually live on rice. The question then suggests itself, why are the facts of the wheat trade so closely studied (and to so little purpose) for the purpose of drawing general inferences as to the economic position of India and the rice trade so entirely ignored? The answer seems to lie in the point of view of the observer. When he is a student or observer of European economics he dwells most largely on the incidents of the trade which most materially affect the condition of European people. The wheat trade of the world is to him a trade of enormous importance, and he is apt to think, looking at the quantities exported from India, that the trade is as important to the supplier as it is to the consumer, or as it is to the supplier from other countries from which wheat is largely exported. The rice trade does not affect the European observer in the same degree. Less than half the Indian export is carried to Europe, whereas all the wheat exported is taken to Europe, and rice does not

there compete in any special degree with European produce as wheat does, and is used for food to a relatively small extent, its main uses being for manufacturing purposes. These circumstances lead to undue neglect of the conditions of the rice trade and to undue attention to the conditions of the wheat trade. Another reason is that the trade is of importance to the management of certain large railway lines in India, for most of the grain is grown at a considerable distance from the coast, and the conveyance of that material portion of the crop which is exported gives what is called a "long lead" to these lines. The management therefore in their reports and addresses lay great stress on this traffic, so much stress indeed that authorities and critics alike are apt to be confirmed in their ideas of the dominating importance of the wheat trade to India. The managers and directors of railways do not refer to the rice trade in this way, because most of it is water-borne from the field to the place of consumption.

THE FOREST RESOURCES OF SIBERIA.

A pamphlet recently published by the Philadelphia Commercial Museum on the importance of Siberia as a source of trade contains some information on the great timber wealth of that country. In western Siberia alone the area of forests belonging to the Crown is estimated at 297,000,000 acres, and in eastern Siberia the area so occupied is considerably greater, but is not exactly ascertained, whilst the basin of the Amour is also rich in forest, consisting of varied and valuable species.

Siberia may be divided, according to the density of its tree-covering, into three zones, each of which is distinguished by characteristic features.

The zone of the northern tall-stemmed woodlands stretches uninterruptedly across the country from the Ural to the eastern shores of Kamschatka, bordering to the north on the tundras, which are the limit of growth of the larger vegetation. The prevailing trees in this zone are larch,

pitchpine, and fir; but in western Siberia a lime tree is met with in the form of underwood, supplying bark and bast which serve as a source of income to the local population.

The zone of birch-forest occupies the low-lying or so-called steppe region. This area is peopled by a settled population, and nearly coincides with the cultivated or agricultural zone of Siberia. The principal and practically the only forest growth in this zone is the birch, with a slight admixture of aspen and willows upon the damper spots and along the banks of the rivers. In this region the birch furnishes the peasant with timber for every purpose; all the huts and farm buildings in the villages are made of it; even the roofs are of birch bark, while in towns and settlements birch is the only fuel and furnishes the sole material for all farming implements. The consumption, therefore, is already very large, and will undoubtedly increase, as this territory is now traversed by the chief artery of the Siberian Railway.

The mountain forest region covers the northern slopes of an almost uninterrupted chain of mountains which run from Semiretchia to Vladivostock. The growth is of a varied character, embracing larch, pitchpine, pine, and cedar, and yields timber of excellent quality; but the exploitation of these mountain forests is said to present considerable difficulties, principally in the way of transport.

With regard to the management of the Siberian forests, it appears that until recently they were free from any supervision. About 40 years ago, however, the Russian Government began to take steps for regulating the use of the timber of western Siberia. In 1863 regulations were introduced whereby the duty of preserving the forests was imposed upon the rural communities, who were allowed in return the right to cut timber for their own needs, but not for sale. Since the year 1884 the administration has been placed upon the same footing as the Crown forests of European Russia.

EXPORTATION OF WHEAT FROM SIBERIA.

Although the opening of the Siberian railways caused some attention to be directed to the prospective capabilities

of Western Siberia as a wheat exporting region, wheat grown in that region has not made its appearance in any appreciable quantities in European markets. It was found that high cost of transit on the main lines of rail made it unprofitable to export Siberian grain to any distance in periods of low prices, and the necessity of providing a new and cheaper route was soon recognised. This difficulty has now been removed, it is believed, by the completion of the Perm-Viatka-Kotlass Railway, which was opened for traffic in September last. According to a report by Mr. Henry Cooke, H.M. Consul at Archangel, this new route brings the produce of the richest grain growing provinces to the waters of the Northern Dwina. It runs from Perm, on the one side, which is in direct railway communication with Tiumen and the great Siberian line, to Kotlass, a small village on the Northern Dwina, whence communication is obtained by the river with Archangel, about 400 miles distant. To facilitate the export of Siberian grain by this rail and river route, agreements have been made with various steamship owners for a regular service of vessels between Archangel and the ports of Rotterdam, Amsterdam, Bremen, Hamburg, London, Hull, Newcastle, and Leith.

Commenting on the possibilities of the new line, Mr. Cooke remarks that the difficulties to be experienced are many and great, such as the insufficient quantity of river barges and lighters; the absence of granaries at Archangel, which will delay the lighters there on their arrival from Kotlass on the opening of navigation and before the White Sea is clear of ice; the shallowness of the river between Kotlass and Archangel during July and August greatly limiting the loading capacity of the river craft; and the generally primitive and incomplete arrangements so far made to meet the increased traffic both at Kotlass and Archangel, together with the lack, hitherto much felt, of working hands during the busy timber shipping period.

In 1898 the quantity of grain carried in transit by the Siberian railways amounted to 12,000,000 bushels, of which 5,610,000 bushels were conveyed to the frontiers and ports of Russia. Meanwhile, the supply of Siberian grain is stated to be annually increasing, and it is estimated that the surplus

available for export now amounts to over 18 million bushels.

The official estimates of the Central Statistical Committee of the Ministry of the Interior relating to the area and production of the principal cereals in Western Siberia in 1898 were as follows :—

	Acres.	Quarters.
Wheat - - -	4,527,400	6,367,600
Rye - - -	2,424,000	2,725,100
Oats - - -	2,873,500	6,102,000

These figures represent the estimated production of the entire western territory, which includes the Governments of Yeneseisk, Irkhutsk, Tobolsk, and Tomsk, and the Steppe Governments of Akmolinsk, Semipatalinsk, Semretchia, and Turgai.

In this territory a peculiar system of agriculture prevails, known as the resting and fallow system, which is described in some detail in a recent publication by the Philadelphia Commercial Museum.* The land is sown two or three years consecutively with grain and then left a year in fallow; this rotation is repeated until the severe falling-off in yield and the choking with weeds compel the land to be abandoned to rest, and a new patch to be broken up. The old land is allowed to rest until definite signs, which are well known to the peasants, show that its productiveness has been sufficiently renewed, when it is again ploughed up and the same process of sowing and fallowing is repeated. As a general rule, in the beginning of the period of cultivation, and on the fallows, more exhausting grains are sown, such as wheat, winter, and spring rye, but towards the end of the period, and upon the stubble fields, such grains as barley and oats. The system of manuring varies. In the southern districts, where there is a fairly large amount of arable land and few meadows, a part of the fallow field, equivalent to $\frac{1}{6}$ or $\frac{1}{2}$, is manured, but further to the north, where very little arable land is to be found, the whole fallow field is manured.

The harvesting of winter grain generally begins at the end of July, that of spring at the beginning of August. The grain

* Siberia, a Coming Market.

harvest is concluded, under normal circumstances, at the beginning of September; but when the weather is unfavourable it is frequently delayed much later, sometimes until October.

Cattle-raising up to the present time is stated to have played only a secondary part in the economic life of the population, although the country is, on the whole, rich in grass land; but the low nutritive value of the forest herbage makes it necessary in the greater part of Siberia to expend much more hay and grazing space upon rearing cattle than is required under similar circumstances in European Russia. The horned cattle are small and belong to the ordinary Russian breed. The sheep are for the most part of a very poor breed, yielding little meat, very little tallow, and wool of inferior quality.

THE FLAX INDUSTRY OF COURTRAI.

The town of Courtrai, in Belgium, ranks second among the commercial and industrial centres of the province of Flanders, and at the commencement of 1898 had a population of 33,128. The exceptionally favoured situation which Courtrai occupies on the banks of the River Lys, in the midst of the flax retting district, is the main cause of the town's prosperity.

The success which attends the manufacture of flax at Courtrai may be attributed, in a great measure, to certain properties possessed by the waters of the Lys, which impart to the flax a remarkable fineness, or spinning quality, combined with extreme tenacity. The peculiar properties with which nature has endowed this stream would appear to have baffled scientific research. Continuous efforts have been and are being made by scientists, especially in Russia, to ascertain the nature of the chemical components to which the Lys owes its rare qualities, but their endeavours have so far proved unavailing. This sluggish and apparently insignificant river thus possesses what may be called a unique monopoly, and, on account of the great benefits it confers upon the district through which it flows, has been well styled "the golden

river." It is a curious fact worthy of some notice that the special properties of the Lys do not extend throughout its entire course, but are confined to that portion of the stream which flows between Comines (Pont Rouge) and Deynze (Barrière d'Astène). From Comines to Menin, the Lys forms the boundary between France and West Flanders, but it is between Menin and Vine St. Eloy that the retting is principally carried on, and at Wevelghen, half-way between Menin and Courtrai, the industry reaches its fullest development.

The demand for flax prepared in the Lys has greatly increased during the past ten years, and the amount of fibre brought for treatment in that river becomes annually larger. The local crop no longer suffices to meet present requirements, and immense quantities of flax arrive from foreign countries, especially Holland and France. The north of France, the Pas de Calais, and the Riverine districts of La Somme supply the greater quantity of French raw flax introduced into Courtrai. Other departments contribute to a certain extent, but not in quantities comparable with those sent by the districts mentioned. Of late years small consignments of flax for retting have also reached Courtrai from the Argentine Republic.

The quantity of flax straw retted in the River Lys last year was calculated at about 90,000 tons; some 12,000 to 15,000 labourers being employed during the six months from April 15 to October 15—that is to say, the season during which retting takes place.

After the retting processes are finished the flax is stored in barns and sheds until winter, when the scutching, that is cleaning the fibre of the woody parts, takes place. This was formerly all done by hand, but at present steam power is largely used, and much is also done by a sort of treadmill.

About 10,000 tons of scutched flax were sent last year to Great Britain and Ireland, the greater quantity going to the latter country.

It is much more difficult to compute the quantity sent to other countries than to the United Kingdom, owing to the different ways and means by which it is carried. For

instance, a considerable quantity is carted in huge waggon loads direct to the spinning mills in the north of France.

The flax trade in Courtrai is almost exclusively in the hands of English or Irish firms, and the few firms of other nationalities have Englishmen in their employ to select and class the flax. In addition to the 20 commission houses engaged in the flax trade, about 10 of the principal Irish spinners have their own buyers resident in Courtrai, and others send their buyers over as circumstances of trade demand it, so that the business is practically in British hands.

During the 1896-97 season, which may be taken as an average year, the value of the flax exported from the Courtrai district was £1,200,000. The shipments for Great Britain and Ireland take place through the port of Ghent by the direct Ghent-Belfast route and other regular lines.

[Foreign Office Report, Miscellaneous Series, No. 519. Price ½d.]

THE GERMAN WOOL TRADE.

The Annual Report on the Trade of Germany, prepared by Mr. Consul-General Schwabach, contains a section dealing with the wool trade in that country. The report states that the most noticeable feature of the woollen business in 1898 was the increasing difference of price between fine merino wool and coarse "cross-bred" wool; and it is considered to be not improbable that this widening divergence in price will continue, as the important and profitable business of sheep-rearing throws large quantities of coarse wool as a bye-product on the market.

It appears that the generally depressed condition of the textile industry during 1898 had an unfavourable influence on wool, but an improvement gradually set in, and although the prices for raw wool, as compared with yarn, were already high at the beginning of 1899, the market in July last showed a still more decided upward tendency. In Australia, in consequence of the long droughts, and in Argentina, as a result of the increasing cross-breeding, merino wool is

produced in considerably smaller quantities than it used to be, and this fact has gradually forced itself on the knowledge of the colonial markets. The scarcity of fine wool has led German manufacturers to use as a substitute cross-bred wool of more or less fine quality; but even this increase of available raw material was not sufficient to prevent a constant rise in the prices of fine wool, and the continued scarcity was so severely felt that the prices of good qualities of cross-bred wool went steadily up.

Mr. Schwabach thinks, however, that the supply of fine cross-bred wool, so frequently used as a substitute for merino wool, will diminish as time goes on, as the quality of the wool, through constant in-breeding, becomes gradually coarser. He remarks that the prices of cross-bred wool are yearly increasing, although not in the same proportion as those of merino wool, and that should cross-breeding in Argentina continue there will be in a few years a dearth of fine merino wool, and fashion will have to content itself with materials of coarser fibre.

Cape wool, it appears, is increasingly used by German combers, and, consequently, the import of Cape wool in 1898 was larger than usual. It is, moreover, cheap, especially as compared with Australian wool. So long as the breeder of combing wool finds his readiest market in this article, he will, in Mr. Schwabach's opinion, direct his attention more and more to the production of the long varieties, while the exports of "two-shear" wool (wool of the second shearing) as well as of washed wool ("snow whites" and "scoured") from the Cape will proportionately decline.

A certain section of the German landowners are reported to be still calling for a duty on wool, but the manufacturers are fighting unanimously against it. As the Government has not as yet responded to this demand, it has been thought possible to make the plan more attractive by introducing at the same time a bounty on export wool. But the merchants and manufacturers are equally opposed to this; and the committee of the Industrial Union of Merchants and Manufacturers have passed a resolution pointing out the fact that the production

of German wool is not even approximately sufficient, either in quality or in quantity, for the requirements of the various wool manufactures, especially those of the textile branch, and that every burden on raw material must reduce the productive power of home industries, and must therefore entail serious injuries on manufacturers and workmen. They therefore protest against the introduction of a wool duty, and also declare at the same time that the injury to their trade would be in no wise removed by the proposed introduction of an export bounty.

[*Foreign Office Report, Annual Series. No. 2344. Price 2½d.*]

CONDITION OF AGRICULTURE IN PORTUGAL.

In a recent Foreign Office Report on the trade of Portugal, which has been compiled by Mr. Harrison, Commercial Attaché to Her Majesty's Legation at Lisbon, it is stated that Portugal is by nature an agricultural, as opposed to an industrial, country, and that in spite of the want of encouragement of their interests, more than 65 per cent. of the population are agricultural, and more than 60 per cent. of the exportation is derived from agriculture. It is claimed that the soil and climate rival those of any country in the same latitude, while the rural population is said to be hard-working, and to possess great natural aptitude for agricultural labour.

The present condition of affairs in Portugal is, however, represented as unfavourable to agricultural interests. The strict system of protection involves high custom duties which greatly increase the prices, and reduce the quality, of necessities. For this reason, in spite of the nominal increase in wages, the life of the agricultural labourer has become so hard that large numbers of the rural population, who could be usefully and remuneratively employed at home, leave the country in the hope of bettering themselves. The country districts thereby become depopulated, and advantages, which are really as great or greater than those to be found by the emigrants abroad, are wasted at home.

The prosperity of agriculture in Portugal is also retarded

by the lack of education, and by the old-fashioned methods of agriculture. Technical and professional instruction are almost entirely wanting among the agricultural classes, very few of whom can even read or write, and the time and labour-saving methods of cultivation that have been adopted elsewhere are not in general use. Although means of transport have enormously increased and markets for Portuguese produce exist all over the world, agriculture has not kept pace with the times, and these facilities are not employed to the utmost. Capital, too, is expensive and difficult to procure, and mortgages already hang heavily on landed property.

Agricultural interests would, however, in Mr. Harrison's opinion, be furthered in Portugal if the costs of production could be reduced, a proceeding which does not appear to be compatible with the system of protection now considered necessary to encourage the newly-developed national industries. Since the removal of the customs duties with Spain, for instance, cattle-breeding has increased enormously, and it is now an important and remunerative industry, which is still open to great development in all its branches. Wine is produced in extraordinary quantities, and fruit and vegetables could be grown in abundance if the importation of machinery were encouraged, and its use taught to the Portuguese labourers. It is believed, therefore, that with increased opportunities for education and a more general employment of machinery, agricultural prospects would improve so rapidly that many of the people who now emigrate would succeed better in their own country.

[*Foreign Office Report, Annual Series, No. 2378. Price 3d.*]

FARM WAGES IN BELGIUM.

A report published by the Belgian Department of Agriculture on the agriculture of the Ardenne district contains interesting information regarding the local supply of labour and rate of wages.

In this district indoor male farm-servants are usually en-

gaged by the year, or by the month; their wages ranging from £1 to £1 12s. per month, while the wages of female indoor farm-servants vary from £1 to £1 4s. monthly. The hours of labour, alike for the farmer's family and the servants, vary from 4 or 7 a.m. to 5 or 9 p.m., according to the season. On small and medium sized farms the family and the servants have their meals together, the ordinary diet consisting of bread (made from rye or spelt), butter, milk, and pork. Meat, other than pork, is provided only on special occasions. The beverage consists of water or coffee, and sometimes beer. On the larger farms the servants take their meals apart from the family; salt beef is sometimes provided for them two or three times a week, and beer every day during the summer.

The number of day and occasional labourers employed naturally varies according to the size of the holdings and the machinery available. While one or two day labourers may be engaged on a small farm, there may be ten or twelve on a large one, but this number would include several women. The men receive from 7½d. to 10d. a day in winter, and in summer from 1s. 3d. to 1s. 7½d. with board, or from 1s. 7½d. to 2s. 1d. without meals. The women are paid 6d. or 7d. in winter and 10d. in summer, with board; and from 7½d. to 10d. in winter, and from 1s. 0½d. to 1s. 5d. in summer, without board. The wages earned are sometimes paid in kind (rye and potatoes), or in the form of cartage on the labourers' own holdings, or land is allotted to them to cultivate.

Occasional and harvest labourers are paid in various ways usually either by piece work, or they are allowed to gather the second crop of hay, or they receive a portion of the produce of the main crop. Many of them possess small holdings and others rent small portions of land, but very few attain to the position of farmers. A few of them emigrate to the industrial centres, and their number is gradually diminishing with the extension of the use of agricultural machinery.

BELGIAN REGULATIONS ON THE SALE OF CHEESE.

A decree published in the *Moniteur Belge* on 21st September, 1899, imposes certain special regulations on the manufacture and sale of cheese in Belgium, in addition to those general laws against unwholesome and adulterated substances which are contained in the Penal Code. By this Decree, the word cheese is to be understood to mean products obtained from milk, with salt, colouring, and flavouring matter only; and cheese containing other substances must be provided with a label printed in plain characters, indicating the nature of the added substances, such as oleomargarine cheese, potato cheese, and bread cheese.

The manufacture or sale of cheese mixed with any mineral matter other than salt, or with antiseptics, is prohibited.

In a report on the Agriculture of Odessa, which has been issued by the Foreign Office, Mr. **Grain Trade of Odessa.** Mackie, Her Majesty's Acting Consul General at that port, particularly refers

to the official statistics of the grain trade for the year 1898, which indicate, as was stated in a previous number of this Journal,* that the grain export trade of Odessa exhibits unmistakable signs of decay. The exports fell from 1,596,780 tons in 1897 to 1,516,120 tons in 1898; while wheat, one of Russia's most important cereals, showed a diminished exportation of 225,810 tons when compared with 1897, and 387,100 tons when contrasted with 1896. In Mr. Mackie's opinion the figures in question suggest gloomy forebodings as to the future position of this important grain exporting centre, since they show, in spite of alternations of good and bad crops, a steady downward tendency during an almost uninterrupted succession of years. Among the causes to which the decreased importance of Odessa as a grain exporting centre is attributed are the steadily increasing home demand, brought about by

* Vol. VI., No. 1, June, 1899, p. 83.

the growing prosperity of the manufacturing industries ; the decentralisation of the grain trade by its diversion to other ports, of which Nikolaiev is the most important ; the limited grain producing area of the rich black soil of South Russia, and low yield per acre, which is fast becoming insufficient to meet the requirements of a rapidly increasing population ; the primitive methods of cultivation of the Russian peasant ; and the unfavourable climatic influences on the crops.

[*Foreign Office Reports, Annual Series, No. 2,366 Price 2½d.*]

According to the official returns of the Ministry of Agriculture, Argentina, the imports of breeding stock into the Republic in 1898 included 482 cattle, 6,206 sheep, and 73 horses from the United Kingdom.

**Argentina's
Imports of
Breeding Stock.**

Among the cattle were 408 Durhams, 30 Herefords, 10 Red Polled, 10 Dexter Kerrys, 9 Polled Angus, and 6 Jerseys. The sheep comprised 5,715 Lincolns, 223 Shropshires, 63 Hampshires, 54 Oxford Downs, 35 South Downs, and 26 Suffolks. The horses were mainly Hackneys and Clydesdales ; there were also 5 Cleveland Bays and 4 Shire horses.

The Annual Report of the Ontario Bureau of Industries contains an estimate of the produce of the creameries and cheese factories in Ontario in 1898. From this it appears that the number of creameries, including skimming stations, which were in operation in that year, was 282, being an increase of 68 over the previous season. Returns of the actual amount of butter made and other particulars were obtained from 109 of these, and on this basis the estimated out-turn of the total number was 9,008,992 pounds, or 1,300,727 pounds in excess of the output of 214 creameries in the previous year. The number of farmers supplying milk

**Creameries and
Cheese Factories
in Ontario.**

was 22, 741, and the average price received for the butter was a little over 9d. per pound, whilst the price paid for the milk was about 3d. per gallon. The number of cheese factories in operation in the province was 1,187, or an increase of 26, and the production of cheese amounted to 1,143,901 cwts., or 82,553 cwts. less than in 1897; the total is, however, above that of any year prior to 1897. The number of farmers supplying milk to the factories was 65,121, the price paid for the milk being slightly higher than that paid in the case of the creameries.

Among the characteristics of a good dairy salt, according to a bulletin issued by the Wisconsin Experiment Station, are a pure white colour, neutral reaction and uniform

Dairy Salt and its Uses.

grain. There should be no offensive odour, and the salt should be practically free from bitter-tasting salts, such as magnesium chloride, and from mechanical impurities. For butter-making the grain should be medium in size, and preferably in the form of a thin flake. The use of salt in butter-making is considered as serving three distinct purposes. In the first place, it aids in the process of working which has for its object the removal of buttermilk. When salt is added to the butter the small globules of buttermilk tend to collect into larger drops, which are more readily worked out. The liquid thus removed from the butter differs from buttermilk in having, in addition to a considerable portion of the salt, no fat and only a small content of protein as compared with that of milk sugar. The value of salt as a preservative is another important reason for its use. The improvement of flavour is the third, and probably the most important, purpose fulfilled by salt. In cheese-making, as in butter-making, salt plays an important part. It tends to lessen the water content of cheese, and in so doing exerts an influence upon the ripening process. It is also equally useful in giving the cheese a pleasant flavour. (*U.S. Department of Agriculture Farmers' Bulletin, No. 107.*)

In continuation of the experiment on the value of skim milk as a food for poultry, which is reported in the Journal for March last,* a further test was made at the Indiana Experiment Station during the past summer. The test, which lasted six weeks, was made with two lots, each composed of Plymouth Rock and Houdan chickens. They were fed three times a day, the food consisting of maize meal, shorts, and ground oats, mixed in equal proportions, together with rape, cabbage, and lettuce. Lot 2 also received skim milk *ad libitum*. This lot ate rather more grain, but showed in the six weeks a gain of $14\frac{5}{8}$ lbs. in weight as compared with $7\frac{3}{4}$ lbs. increase in Lot 1, and it is considered that the effect of the addition of skim milk to the ration is to increase the profit by securing a greater return from the other foods given, especially when the chickens are young and confined in pens or small yards.

The Board of Agriculture have issued a notice drawing the attention of persons desirous of importing dogs into Hong Kong to the provisions of a Notification issued by the Government of that Colony on the 21st March, 1899. Imported dogs will only be allowed to land in the Colony (a) on production of a certificate from a veterinary surgeon, or a Medical Officer of Health, or a British Consul, that no case of rabies has been known to occur in any district in which the dog has been kept for the six months prior to the date of shipment, and (b) a statutory declaration by the captain of the vessel (or by the importer if he has travelled with the dog) that no case of rabies occurred on board during the voyage. In default of these two certificates, the dog will be kept in quarantine for a period of three months from the date of importation at the expense of the owner. Upon the production of the two certificates, or upon the expiration of the quarantine, a licence and a badge will be issued, and any dog permitted to land or found at large without such badge will be destroyed.

* Vol. V., No. 4, p. 507.

In an experiment conducted at the Ontario Agricultural College in the summer of 1899 it was found that skim milk was a valuable and cheap food for raising young ducks.

**Skim Milk for
Fattening Ducks.**

Some ducks were separated into two lots, and fed upon a mixture composed of equal parts of bran, middlings, and corn meal. For Lot I. the mixture was moistened with skim milk; while for the diet of Lot II. boiling water was used. Lot II. also received a small amount of animal meat and cut green bone in their ration. At the end of six weeks all were weighed. The average weight of those in Lot I. was over four pounds each, produced at a cost of $1\frac{3}{4}$ d. per pound. The average weight of Lot II. was three pounds each, and the cost of production slightly more than Lot I., the cost in both cases representing the feed only, without reckoning the value of the eggs or cost of attendance. During the next four weeks both lots were fed alike, and their respective gain was nearly equal, Lot I. having an average weight of $6\frac{1}{2}$ lbs. each, while the others averaged nearly $5\frac{1}{2}$ lbs.; but during this period it required more food to produce the one pound gained, the cost being about $2\frac{1}{2}$ d. per pound.

The twelfth Agricultural Census of the United States will be taken on June 1st, 1900, and will collect information relating to the crops of

**Agricultural
Census of the
United States.**

the preceding year, and the stocks of animals, poultry, and bees existing on June 1st, 1900. The inquiries will be divided into seventy-eight heads, and will comprise the acreage, tenure, and value of the farm, and the acreage, quantity, and value of the various crops; the quantity and value of dairy products, honey, eggs, wool, cider, wine, sugar, poultry, meat, timber, and of other products; the number and value of farm animals, of swarms of bees, and of fowls. The number of pure-bred animals, of dairy cows, and the quantity of home-made factory cheese and butter produced will also be separately distinguished.

The latest return of the number of persons engaged in agricultural and pastoral pursuits in West Australia relate to the year 1897, when the population so occupied numbered 11,843. Of this number, 5,755 males and 749 females were engaged principally in farming; 176 males and 212 females principally in dairying; 2,983 males and 1,205 females in pastoral pursuits, and 701 males and 62 females in fruit farming and market gardening.

[Statistical Register of Western Australia for 1897, published in 1899.]

The shipments of frozen mutton and lamb from New Zealand in the year ending 31st March, 1899, amounted to 2,731,762 carcasses, made up of 1,618,422 mutton carcasses and 1,113,340 lamb carcasses valued together at £1,347,733; the export in the preceding year was 2,995,204 carcasses valued at £1,545,769. The decreased exportation of the past season is stated to be due to the long spell of dry weather, which had compelled owners to get rid at the earliest opportunity of every sheep fit to freeze, as well as those for boiling down; they were, therefore, disposed of at least a couple of months before the usual time and appeared in the total for the previous year. The breeding of lambs for freezing is receiving considerable attention, the breeds most favoured for early maturity being Shropshires and Southdowns, though in some districts crosses from Shropshire rams and Lincoln ewes are found to mature early. The quantity of beef exported was 91,729 cwts. as compared with 69,494 cwts. in 1898 and 22,892 cwts. in the preceding year. The whole of this beef was shipped from North Island, and a further increase is looked for in the current season.

The export of butter from New Zealand in the year 1898-99 was slightly less than in the preceding year, being 102,479 cwts., as compared with 106,840 cwts. in 1897-98; the value, however, showed an increase, being £433,481 against £429,407. The export of cheese, on the other hand, declined to a figure below that of any year since 1892-93, only 50,490 cwts., valued at £100,992, having been exported in the past year, a decrease of 28,215 cwts. in quantity, and £53,152 in value when compared with 1897-98. The arrangements for the free storage and freezing of butter prior to shipment to the United Kingdom were continued, and the grading was extended to all butter and cheese shipped to the Australian colonies. The grading of the produce for Australia was undertaken at the urgent request of the shippers, and its value is now fully recognised by both sellers and buyers.

**Export of Dairy
Produce from
New Zealand.**

The report of the Russian Minister of Finance on the Budget of 1900 states that the sum allocated to the Ministry of Agriculture and Crown Domains amounts to £4,373,000, as compared with £3,945,000 in 1899. A grant of £1,191,000 is allowed for administrative purposes, and £238,000 for agricultural, forestry, and mining schools. Buildings, materials, labour, etc., are debited with £1,992,000, and provincial and communal land taxes in connection with State lands and forests account for £499,000. There is a grant of £189,000 for endowments, of £241,000 for sundry expenses, and an appropriation of £23,000 for the immediate requirements of 1901.

The *Smör-Tidende*, quoting from the *Torgovo Promyshlennaya Gazeta*, states that the exportation of eggs from Russia is increasing yearly, the shipments last year amounting to 1,800 million eggs, of the value of £3,300,000. Among the

**Russian Agri-
cultural Budget
of 1900.**

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Exports.**

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articles exported eggs now take the fourth place, ranking after grain, flax, and wood; but it is to be noted that the exportation is subject to far less fluctuation than most other articles. The eggs usually come from South Russia and the Volga Basin, and about 1,500 millions are shipped from St. Petersburg, Revel, Riga, and Libau, or exported by rail *via* Wierzbolovo, Alexandrov, or Sosnowice. The remaining 300 millions are exported from the points on the frontier lying nearest to the place of production. On account of the great importance of the egg trade, the free importation of packing-cases for the export of eggs has now been permitted under provisions similar to those regulating the free importation of sacks for grain export. This concession, which will last for five years, has, it is stated, been granted chiefly in the interests of small traders who export their goods from frontier towns not on the railway lines.

The exports of butter from Finland amounted in 1898 to 27,236,447 lbs., as against 32,034,735 lbs. in the previous year. The shipments of 1898 included 15,643,250 lbs. to the United Kingdom, and 9,847,200 lbs. to Denmark. The exports of milk and cream amounted to 4,366,028 lbs., all of which was consigned to Russia; and of cheese 567,567 lbs. were exported. In the same year Finland imported 946,000 lbs. of butter and 239,736 lbs. of cheese, mainly from Russia.

(*Finland's Handel och Sjöfart*, 1899.)

Numerous experiments and practical work done by individual feeders in Canada have proved the great value of dairy by-products as part of the rations for fattening swine. There is practically no difference in the feeding value of skim milk, buttermilk, or whey, when all three are fed in prime condition, except that, of course, the skim milk will be richer or poorer according to the care taken to remove the butter-fat in the separator. Five pounds of skim milk

**Dairy by-products
for fattening
Swine.**

per head a day is an economical allowance in fattening swine over one hundred pounds in weight, when mixed grains are fed. Where maize was fed, as in Wisconsin, the best returns were secured with not more than three pounds of milk to each pound of maize-meal. Professor Robertson has found that one pound of mixed peas, barley and rye is equivalent to 6.65 pounds of skim milk. The protein and ash in the milk are what are needed to give strength to the bones and develop the muscles sufficiently. Professor Day, of the Guelph Experiment Station, has shown the marked influence of whey and skim milk, not only in causing rapid and economical gains, but in producing a fine quality of bacon, even when no exercise is given to the fattening stock, and in counteracting the tendency to softness produced by the too lavish feeding of shorts. The average results of experiments at the Guelph and Wisconsin stations show that 785 pounds of whey are equal to 100 pounds of grain.

[Report of the Superintendent of Farmers' Institutes, Ontario.]

According to a Memorandum received from H.M. Embassy at Berlin, the German Estimates for 1900 make provision for the appointment of a second Agricultural Attache in the United States, who is to be attached to the German Consulate-General in New York. In the course of the debate on the Estimates, before the Budget Committee, Mr. Gastrell reports that it was stated by the Government that an Agricultural Attache had already been sent to Buenos Ayres, and that another would be despatched later to the West Coast of South America.

**German
Agricultural
Attaches.**

REPORTS ON FOREIGN CROPS.

UNITED STATES HARVEST OF 1899.

The final report of the Statistician of the United States Department of Agriculture, issued in January last, gives the following particulars respecting the acreage and production of the principal crops in that country in 1899 :—

Crop.	Area.	Production.	
		Total.	Per Acre.
	Acres.	Winchester Bushels.	Winchester Bushels.
Wheat - - -	44,592,516	547,303,846	12'3
Maize - - -	82,108,587	2,078,143,933	25'3
Oats - - -	26,341,380	796,177,713	30'2
Rye - - -	1,659,308	23,961,741	14'4
Barley - - -	2,878,229	73,381,563	25'5
Buckwheat - -	670,148	11,094,473	16'6
Potatoes - - -	2,581,353	228,783,232	88'6
		Tons.	Tons.
Hay - - -	41,328,462	56,655,756	1'35

As compared with 1898, the area under wheat has increased by 537,238 acres, but owing to the diminished yield (12'3 instead of 15'3 bushels per acre) the total produce was reduced below that of 1898 by 127,844,859 bushels. Maize shows an increase in area of 4,386,806 acres, and in production of 153,959,273 bushels. Oats and rye show a small increase in area, but the produce of the latter was less; while a rise of nearly 300,000 acres under barley is accompanied by an augmented production of over 17½ million bushels. Potatoes on almost the same area as in 1898 gave 36 million bushels more; but the production of hay, from an area

diminished by nearly a million and a half acres, fell short by almost ten million tons.

RUSSIAN HARVEST OF 1899.

The figures quoted in the last number of this Journal from the *Trade and Industries Gazette* relating to the results of the harvest of 1899 in Russia have been confirmed by the official estimates issued by the Department of Rural Economy and Statistics of the Ministry of Agriculture at St. Petersburg. According to these estimates, the yields of the four principal crops in the sixty-three Governments included in European Russia, Poland, and Cis-Caucasia, were as follows:—

	1899. Quarters.	1898. Quarters.
Wheat - - - - -	46,449,000	50,587,000
Rye - - - - -	96,841,000	86,982,000
Barley - - - - -	27,023,000	38,795,000
Oats - - - - -	84,021,000	71,653,000

The estimates of the Central Statistical Committee of the Ministry of the Interior of the results of last year's harvest of winter wheat and rye were published in the Journal of the Ministry of Finance on January 21st. For the sixty-three Governments referred to above these estimates give 20,250,000 quarters of winter wheat, and 101,768,000 quarters of rye; and, with the addition of the spring grain, the total harvest of wheat and rye is estimated to amount to 49,094,000 quarters and 102,250,000 quarters respectively, whereas, returns issued by the Ministry of Agriculture give, as has been shown above, 46,449,000 quarters of wheat and 96,841,000 quarters of rye.

The report of the Russian Minister of Finance on the Budget for the present year contains the following information regarding the agricultural conditions of the Empire. It states that the bad crops of the past few years have caused the Russians anxiously to consider the possibility of the exhaustion of their soil, hitherto rich and fertile. The bad harvest of the year 1897 was followed by a poor yield in 1898, although the crop, slightly better than that of 1897, was very unevenly distributed throughout the Empire. In

the Central Provinces, and those situated in the basin of the Volga and in the region of the Ural Mountains, the harvest in 1898 was from 60 to 70 per cent. below the preceding quinquennial average. Hence, the very part which usually exported its surplus to the rest of Russia, was not only unable to supply its own requirements, but the importation of grain for food and seed became necessary.

The grain harvest of 1899 promised well at the outset. In 64 provinces in European Russia and the Caucasus the summer and winter cereals yielded 13 per cent. more than the average. But there was an absolute scarcity in several provinces, and in others the crops suffered much from the heavy rains.

This series of three bad harvests caused some apprehension that there might be no improvement in the current year. Last year's crops, however, give indications to the contrary, inasmuch as the eastern and central provinces, which yielded a poor harvest in 1898, gave a most abundant return in 1899; and, conversely, the districts which yielded least last year had produced a crop about the average in 1898. Hence it is inferred that the recent bad harvests are merely due to temporary causes and not to the exhaustion of the soil. At the time of writing the Minister states that the promising appearance of the young crops gave good prospects of an abundant yield of winter corn in 1900.

CROPS IN INDIA.

The first general memorandum on the wheat crop of the season 1899-1900 was issued at the end of last December. In all the wheat-producing region a very restricted area was placed under this grain, the season being adverse to sowing. The seed germinated well, however, in Northern India, and on irrigated lands the crop was coming on, but would be greatly helped by the arrival of the winter rains.

In the Panjab, especially, everything depended on the rain. The area sown there was just under five million acres, or 36 per cent. below the area of 1898-99, the irrigated area being 18 per cent. below last year. This outlook at the time

was not encouraging. In the North-West Provinces and Oudh, dry weather had helped to reduce the sowings by 15 per cent.; the seed germinated well, and the prospects of this irrigated crop were good. In dry lands everything depended on the timely arrival of rain. In the remaining wheat regions the prospects were much more discouraging. In the Central Provinces, with few exceptions, an almost total failure was to be looked for unless rain came. In Bombay it seemed unlikely that more than half the average acreage would be sown. In Sind, Gujerat, and the Deccan the area is smaller than usual, but larger in the Karnatak while in Berar it was only a twentieth of last year's area. In these districts the drought rendered the prospects very poor on dry lands, although the crop was generally in fair condition in Sind and on irrigated lands.

ARGENTINE WHEAT CROP OF 1898-99.

The Division of Statistics and Rural Economy of the Argentine Ministry of Agriculture has recently published an estimate of the area and production of the wheat crop of the Republic in 1898-99. The estimate is based on returns collected from the owners of threshing machines, the latter being already registered for purposes of taxation, in the provinces of Santa Fé, Buenos Ayres, Cordova, and Entre Rios. From the results ascertained in these provinces, the area sown with wheat in Argentina in 1898-99 is estimated to have exceeded 7,500,000 acres, and the production of grain to have amounted to 104,952,000 bushels.

The consumption of wheat per head of the Argentine population formed the subject of inquiry at the national census, and is estimated at five bushels per annum. The average quantity of wheat used for seed is calculated at one bushel per acre.

THE BELGIAN HARVEST OF 1899.

The official preliminary return of the yield of crops in Belgium in 1899, received through the Foreign Office, shows

that the corn harvest last year was below the average, but potatoes and beet-root, as well as flax, were larger than usual. The yield per acre is given as follows :—Wheat 26·0 bushels; rye 25·3 bushels; barley 37 bushels; oats 42·4 bushels; potatoes 7 tons; hay 1·8 tons; clover 2·3 tons; sugar-beet 12 tons; mangolds 17·1 tons; and flax 4·9cwts.

CROPS IN FRANCE.

A report on the acreage and condition of the wheat and rye crops in France at the beginning of this year was published in the *Journal Officiel* of the 27th January last. Compared with the previous year, the acreage under wheat is stated to have increased from 1 to 5 per cent. in ten departments. It has not altered in forty-five departments, but it has decreased from 1 to 5 per cent. in twenty-five departments and to a greater extent in four others. Similarly as regards rye the acreage is greater than in 1899 in three departments; it has remained the same in fifty-eight and it has decreased in twenty-four departments. There are two departments where rye is not grown.

The condition of the crops is represented figuratively by the following numbers: 100 indicates that the appearance of the crop is "very good," 80 means "good," 60 "fairly good," 50 "passable," and 30 "middling." As regards wheat, eight departments were marked 100; 57 varied from 99 to 80; 17 from 79 to 60; 4 from 59 to 50; and one is indicated by the figure 30. The appearance of the rye crop was "very good" in 12 departments, "good" in 54, "fairly good" in 18, and "passable" in 1 department.

THE GERMAN HARVEST OF 1899.

The method of collection of the particulars as to the condition and statistics of the crops in Germany underwent considerable modification last year, and comparison of the returns for 1899 with those of previous years has been

thereby rendered difficult. The following table shows the area and production of the principal crops last year :—

CROP.	Area.	Production.	
	Acres.	Total.	Per Acre.
		Bushels.	Bushels.
Wheat - - - - -	4,980,730	141,368,028	28'38
Spelt - - - - -	800,566	17,493,317	21'85
Rye - - - - -	14,501,538	318,777,517	21'98
Barley (Spring) - - - -	4,052,944	131,565,061	32'46
Oats - - - - -	9,879,368	389,065,942	39'38
		Tons.	Tons.
Potatoes - - - - -	7,734,714	37,877,982	4'90
Clover (hay) - - - - -	4,506,594	8,146,462	1'81
Lucerne (Hay) - - - - -	553,539	1,329,752	2'40
Permanent Grass (for hay) -	14,542,303	23,392,174	1'61

The wheat harvest appears to have been best, on the whole, in the northern portions of the Empire, particularly about Schlewig-Holstein (over 40 bushels per acre) and Oldenburg. Rye, on the other hand, was generally better in the south, especially in Hesse. Of the potatoes 116,532 tons, or 3 per cent. of the whole, were reported to be diseased; Saxony seems to have suffered most in this respect. Clover lucerne, and meadow hay all gave a considerably better yield in the south than in the north, being best in Baden and Hesse and poorest in the extreme north-east.

The principal changes in area between 1898 and 1899 appear to have been increases of 116,532 acres under wheat, of 125,661 acres under potatoes, 55,501 acres under clover, and 23,717 acres under lucerne; while rye showed a decrease of 183,084 acres and permanent grass for hay one of 68,920 acres.

The changes in yield between 1898 and 1899 cannot be ascertained with any degree of certainty owing to the alteration in the system of collecting the particulars. The official return states that comparison should be made rather with the earlier so-called preliminary estimates of former years than with the so-called final harvest reports.* Judged by

* These preliminary estimates were always considerably above the final, usually by some 10 per cent. or more.

this standard, the yield of wheat, rye, clover, lucerne, and meadow hay were below the yield of 1898, while wheat, barley, oats, and potatoes were higher.

SPANISH WHEAT HARVEST OF 1899.

The official estimates of the results of the past year's harvest in Spain were published in the *Gaceta de Madrid* of February 28th last. According to the returns collected by the Department of Agriculture of the Ministry of the Interior, the total area of irrigated and non-irrigated land under wheat in 1899 was 9,049,000 acres, and the crop obtained from this acreage is estimated to have amounted to 97,680,000 bushels, thus representing a yield of 10·7 bushels per acre. It was calculated that the quantity of wheat required for consumption in the year succeeding the harvest would amount to 82,895,000 bushels, and that 13,149,000 bushels would be employed for seed.

SWEDISH HARVEST OF 1899.

According to the returns issued by the Swedish Statistical Bureau, the harvest of 1899 was below the average. There was a good yield of wheat and a moderate one of rye, but the produce of other grains as well as of potatoes was well below the average. As to forage crops the yield was not sufficient everywhere to meet the requirements. The estimated produce of the several crops is shown below.

Crop.	1899.	Average. 1889-98.
	Bushels.	Bushels.
Wheat - - - - -	4,293,300	4,151,125
Rye - - - - -	20,773,775	21,533,875
Barley - - - - -	11,329,725	13,986,500
Oats - - - - -	52,038,525	61,376,425
Mixed Corn - - - - -	8,582,750	8,627,025
Peas - - - - -	1,115,950	1,444,300
Beans - - - - -	187,550	198,275
Vetches - - - - -	562,374	711,975
Potatoes - - - - -	32,877,350	52,374,850

THE MANITOBA HARVEST OF 1899.

The actual yield of wheat in Manitoba in 1899 as reported by the Department of Agriculture in December last was much less than the preliminary estimate of August. The principal causes of this shrinkage are stated to be a period of drought in August and the ravages of the Hessian Fly. The damage from the latter cause was most serious in the Red River Valley.

The following table gives the final results of the harvest of cereals, potatoes, and roots in the past year, together with the figures for 1898:—

Crop.	Area.		Production.	
	1899.	1898.	1899.	1898.
	Acres.	Acres.	Bushels.	Bushels.
Wheat - - - -	1,629,995	1,488,232	27,922,230	25,313,745
Oats - - - -	575,136	514,824	22,318,378	17,308,252
Barley - - - -	182,912	158,058	5,379,156	4,277,927
Potatoes - - - -	19,151	19,791	3,236,395	3,253,038
Roots - - - -	10,079	8,448	2,670,108	2,471,715

The yield of flax was 304,920 bushels ; of rye, 64,340 bushels ; and of peas, 20,490 bushels.

The returns of live stock in the province remained almost stationary, the numbers being 102,655 horses, 220,248 cattle, 33,092 sheep, and 66,011 pigs. The number of beef cattle exported was 12,000, and there were 25,000 yearlings consigned to ranches in the North-West Territories and about 10,000 to the United States. The production of dairy and creamery butter during 1899 amounted to 2,357,049 lbs., and of factory cheese to 848,587 lbs.

THE ONTARIO HARVEST OF 1899.

The official report on the harvest of Ontario for the year 1899 indicates that the total area cultivated in the province

was 8,753,926 acres as compared with 8,835,272 acres in 1898.

The following table shows the acreage and yield of the principal crops with the relative figures for the previous year and the average for the period 1882-99.

Crop.	Acreage.			Yield.		
	1899.	1898.	1882-99	1899.	1898.	1882-99.
	Acres.	Acres.	Acres.	Bushels.	Bushels.	Bushels.
Autumn Wheat -	1,049,691	1,048,182	908,677	14,439,827	25,158,713	18,220,140
Spring Wheat -	398,726	389,205	470,226	7,041,317	6,873,785	7,247,187
Barley - -	490,374	438,784	622,598	14,830,891	12,663,668	16,157,273
Oats - - -	2,363,778	2,376,360	1,930,221	89,897,724	86,858,293	67,131,824
Rye - - -	137,824	165,089	112,655	2,284,846	2,673,234	1,823,170
Buckwheat - -	132,082	150,394	100,640	2,203,299	2,373,645	1,945,086
Potatoes - -	168,148	169,946	160,060	19,933,366	14,358,625	12,436,674

The area under hay and clover was $2\frac{1}{2}$ million acres, which yielded a crop of $3\frac{1}{2}$ million tons. The apple crop yielded 19,126,439 bushels, or an average of 3.02 bushels per tree of bearing age; the number of these trees was 6,324,842, and there were 3,445,135 young trees in addition.

The yield of tobacco was estimated at 2,241,562 pounds from 2,206 acres, or 1,016 pounds per acre. Orchards and gardens accounted for 338,073 acres, while there were 10,802 acres in vineyards. The smallest are as tabulated refer to flax and hops, which in 1899 covered 7,103 and 1,146 acres respectively.

The animals enumerated in the province on the 1st July last included 615,524 horses, 2,318,355 cattle, 1,772,604 sheep and 1,971,070 swine; these figures showing in each case a considerable increase over those for the previous year.

PARLIAMENTARY PUBLICATIONS.

Agricultural Statistics, Ireland.—Tables showing the extent in statute acres and the produce of the crops for the year 1899 (C. 9488). Price 2½d.

The yield of the crops in Ireland in 1899 was generally below that of 1898, but above the mean rate for the ten years 1889-98. The following table shows the area and produce of the principal crops in 1899, compared with the average of the ten preceding years :—

Crop.	Area.		Production.		Yield per Acre.	
	1899.	Average.	1899.	Average.	1899.	Average.
Wheat, - - - -	Acres. 51,866	Acres. 61,728	Cwts. 927,452	Cwts. 1,010,448	Cwts. 17'9	Cwts. 16'4
Oats - - - -	1,135,536	1,215,524	17,895,880	18,119,517	15'8	14'9
Barley, - - - -	169,469	172,755	3,040,083	2,962,293	18'0	17'1
Bere - - - -	209	280	3,090	3,740	14'8	13'4
Rye, - - - -	12,113	13,299	155,738	167,720	12'9	12'6
Potatoes - - - -	662,914	726,045	Tons. 2,760,287	Tons. 2,583,098	Tons. 4'2	Tons. 3'6
Turnips - - - -	301,449	304,580	4,309,053	4,428,232	14'3	14'5
Mangolds and Beet - -	62,714	51,079	1,065,961	773,692	17'0	15'1
Flax - - - -	34,989	77,189	7,158	13,639	Stones. 32'7	Stones. 28'3
Hay { Clover, Sainfoin, and Rotation Grasses. Permanent Pasture.	624,163 1,494,744	638,479 1,519,628	1,362,569 3,513,226	1,355,326 3,419,053	Tons. 2'2	Tons. 2'1
					2'4	2'2

It will be noticed that, with the exception of mangel and beet, the areas under all the crops included in the above table were below the average in 1899, the greatest difference being shown in the case of potatoes and flax. As compared with the previous year, 1898, the most noteworthy changes are an increase of 11,457 acres in barley, 6,759 in mangel, and 520 acres in flax. Wheat decreased by 932 acres, oats

by 29,823 acres, potatoes by 1,950, turnips by 5,480, and hay (both categories together) by 55,563 acres. The only crops to show an increased yield per acre in 1899 over 1898 were bere and flax, which gave 1·2 cwts. and 1·5 stones more per acre respectively. On the other hand, the only crop failing in 1899 to surpass the average of the years 1889-98 was turnips, which gave 4 cwts. below the normal, and $2\frac{1}{2}$ tons below 1898.

The special return as to potatoes shows that the relative area under the Champion variety still declines, amounting to 68 per cent. of the whole in 1899, as compared with 70 per cent. in 1898. In Dublin, Wicklow, Antrim, Donegal, Down, Londonderry, and Tyrone there is less tendency to rely on Champions than in the other counties of Ireland. The area under Beauty of Bute, it may be mentioned, increased in this year from 27,000 acres, or from 4 to 6 per cent. of the total area under potatoes.

The statistics of bee-keeping for 1898 show that 526,374 lbs. of honey were produced in that year. This is nearly double the average of the preceding ten years (287,000 lbs.), and is over 100,000 lbs. more than the largest quantity previously recorded in that period.

THE FERTILISERS AND FEEDING STUFFS ACT.

Reports received by the Board of Agriculture show that samples were analysed under the Fertilisers and Feeding Stuffs Act, 1893, in 53 counties and county boroughs during the year 1899, the total number of analyses having been 965, of which 686 were samples of fertilisers and 279 of feeding stuffs.

The reports show a decrease of 22 (12 fertilisers and 10 feeding stuffs) in the number of samples analysed, as compared with the preceding year. The diminution occurred both in England and Scotland, but there was an increase in Wales.

The comparison between 1899, 1898, and 1897 for the whole country stands as follows :

	Number of Counties Reporting Analyses.			Total Number of Samples Analysed.		
	1899.	1898.	1897.	1899.	1898.	1897.
England, counties -	26	27	29	438	445	391
„ boroughs -	3	2	2	110	128	77
Wales, counties -	5	6	7	64	49	41
Scotland, counties -	19	20	18	353	365	341
„ boroughs -	—	—	1	—	—	2
GREAT BRITAIN -	53	55	57	965	987	852

The number of analyses made in each of the four quarters of 1899 may be shown as under :—

	Fertilisers.				Feeding Stuffs.			
	Quarter.				Quarter.			
	1st.	2nd.	3rd.	4th.	1st.	2nd.	3rd.	4th.
England, counties -	96	105	20	56	51	31	28	51
„ boroughs -	42	21	4	16	4	7	5	11
Wales, counties -	30	9	1	11	3	1	—	9
Scotland, counties -	83	171	13	8	17	27	11	23
„ boroughs -	—	—	—	—	—	—	—	—
GREAT BRITAIN -	251	306	38	91	75	66	44	94

The following summary shows the number of samples analysed in each of the counties and boroughs from which analyses were reported in 1899 and 1898 :—

COUNTIES REPORTING ANALYSES.	1899. Number of Samples Analysed.			1898. Number of Samples Analysed.		
	Ferti- lisers.	Feed- ing Stuffs.	Total.	Ferti- lisers.	Feed- ing Stuffs.	Total.
ENGLAND :						
Chester - - - - -	2	6	8	7	3	10
Cornwall - - - - -	—	—	—	5	—	5
Cumberland - - - - -	3	4	7	5	—	5
Devon - - - - -	16	1	17	11	5	16
Dorset - - - - -	6	19	25	4	25	29
Durham - - - - -	4	—	4	6	2	8
Essex - - - - -	19	8	27	15	1	16
Gloucester - - - - -	4	7	11	7	1	8
Hants - - - - -	—	8	8	6	1	7
Hereford - - - - -	22	1	23	13	2	15
Huntingdon - - - - -	—	1	1	—	—	—
Kent - - - - -	7	—	7	7	1	8
Lancaster - - - - -	—	—	—	—	1	1
Leicester - - - - -	—	1	1	—	1	1
Lincoln, Parts of Kesteven - - - - -	—	—	—	—	3	3
Monmouth - - - - -	49	34	83	42	51	93
Norfolk - - - - -	1	1	2	—	—	—
Northumberland - - - - -	—	—	—	2	1	3
Oxford - - - - -	3	—	3	1	5	6
Salop - - - - -	19	11	30	28	13	41
Somerset - - - - -	16	2	18	16	6	22
Stafford - - - - -	3	—	3	1	1	2
Surrey - - - - -	8	4	12	13	—	13
Sussex, Eastern Division - - - - -	4	3	7	1	2	3
Westmorland - - - - -	25	15	40	31	12	43
Wilts - - - - -	11	24	35	29	23	52
Worcester - - - - -	34	—	34	20	1	21
York, East Riding - - - - -	—	3	3	—	5	5
„ North Riding - - - - -	4	4	8	—	—	—
„ West Riding - - - - -	17	4	21	7	2	9
COUNTY BOROUGHS :						
Canterbury - - - - -	48	5	53	57	5	62
Liverpool - - - - -	—	3	3	—	—	—
Newport, Mon. - - - - -	35	19	54	20	46	66
TOTAL ENGLAND - - - - -	360	188	548	354	219	573

Continued on next page

COUNTIES REPORTING ANALYSES.	1899. Number of Samples Analysed.			1898. Number of Samples Analysed.		
	Ferti- lisers.	Feed- ing Stuff.	Total.	Ferti- lisers.	Feed- ing Stuff.	Total.
WALES:						
Cardigan - - - - -	11	—	11	17	—	17
Carmarthen - - - - -	10	2	12	4	—	4
Denbigh - - - - -	—	—	—	1	—	1
Flint - - - - -	—	—	—	2	—	2
Glamorgan - - - - -	—	6	6	—	—	—
Montgomery - - - - -	16	5	21	15	—	15
Pembroke - - - - -	14	—	14	10	—	10
TOTAL WALES - - -	51	13	64	49	—	49
SCOTLAND:						
Aberdeen - - - - -	14	5	19	13	2	15
Argyll - - - - -	3	1	4	2	1	3
Ayr - - - - -	31	1	32	42	1	43
Banff - - - - -	5	1	6	3	2	5
Berwick - - - - -	—	7	7	10	1	11
Bute - - - - -	—	—	—	3	1	4
Caithness - - - - -	—	—	—	1	—	1
Dumbarton - - - - -	3	—	3	—	—	—
Dumfries - - - - -	5	—	5	11	1	12
Fife - - - - -	—	—	—	4	1	5
Forfar - - - - -	3	7	10	1	3	4
Kincardine - - - - -	15	—	15	8	—	8
Kirkcudbright - - - - -	9	1	10	19	3	22
Lanark - - - - -	9	—	9	8	—	8
Linlithgow - - - - -	36	8	44	26	5	31
Midlothian - - - - -	12	2	14	19	3	22
Peebles - - - - -	1	—	1	—	—	—
Perth - - - - -	91	31	122	96	23	119
Renfrew - - - - -	8	3	11	—	3	3
Ross and Cromarty - - - - -	20	9	29	14	12	26
Selkirk - - - - -	—	1	1	7	8	15
Wigtown - - - - -	10	1	11	8	—	8
TOTAL SCOTLAND - -	275	78	353	295	70	365
TOTAL GREAT BRITAIN	686	279	965	698	289	987

PRICES OF LIVE STOCK AS RETURNED UNDER THE WEIGHING OF CATTLE ACT.

The returns of prices obtained under the Markets and Fairs (Weighing of Cattle) Act, 1891, for the last quarter of 1899 enable the complete figures for that year to be presented in a table which appears on page 543.

The numbers, both of cattle and sheep, entering the scheduled markets of Great Britain in the quarter ending 31st December were considerably less than in the corresponding quarter of 1898. The cattle weighed were also fewer, but the number of sheep weighed shewed a marked increase, particularly at Liverpool and Aberdeen. Statistics, both of the numbers of animals and of the prices realised during the quarter, will be found in the series of tables on pp. 540-542.

The returns for the complete year 1899 are summarised in the accompanying statement, and in the case of cattle and sheep, the numbers vary but slightly from those of 1898. The cattle entering the markets, at the places scheduled under the Act, were less by about two per cent., while the numbers weighed and priced were very slightly larger than in the previous year. The comparative figures for sheep entering the markets show even closer approximation, notwithstanding the fact that the numbers concerned are nearly four times as many. The returns for pigs have less importance, but the great increase in the number entering the markets—considerably exceeding the records for any previous year since the Act came into force—is perhaps worthy of notice.

Animals.	1899.	1898.
CATTLE :	No.	No.
Entering markets - - - -	1,236,091	1,263,991
Weighed - - - - -	139,482	138,652
Prices returned - - - -	124,552	124,197
Prices returned with quality distinguished - - - -	103,613	102,299
SHEEP :		
Entering markets - - - -	4,681,602	4,691,619
Weighed - - - - -	48,643	49,953
Prices returned with quality distinguished - - - -	42,154	40,460
SWINE :		
Entering markets - - - -	455,056	363,370
Weighed - - - - -	2,205	1,614
Prices returned with quality distinguished - - - -	2,070	1,437

There would appear to have been during the past year some slight extension of the practice of weighing cattle in English markets. Thus 45,101 out of a total of 966,197 were returned in 1898 as weighed, while in 1899 the number weighed was 53,224 out of a total of 945,636. This increase is almost entirely attributable to three markets, viz., Shrewsbury, Wakefield, and, in a less degree, Carlisle. At the two former places the number of cattle weighed during the past year was doubled as compared with 1898. Shrewsbury is still distinguished for the extent to which the scales are used in the sale of store stock, about four-fifths of the cattle weighed at that market being of this class. At the Scottish markets the extent to which the weigh-bridge was used remained very much as in 1898, but taking Great Britain as a whole the percentage of the cattle entering the markets which were weighed was 11·28, or higher than in any previous year. In the weighing of sheep there was no great change, an increase in the number weighed at Liverpool being more than counterbalanced by a decrease at Leeds, London, and Wakefield.

Prices are now available in conjunction with live weight for 103,613 cattle as compared with 102,299 in 1898 out

of a larger number entering the markets. All the six Scottish markets contribute to this total, the proportion of priced animals being least satisfactory in the case of Perth. In two of the 15 English markets, Ashford and Salford, not a single weighed animal was priced, and in five other instances the returns were insignificant.

From twelve places in Great Britain, however, the data now supplied are sufficient to form the basis of a fairly reliable record of prices, and the total numbers of the animals of each quality, with the average price of each grade, are shown separately for these places in the following table:—

PLACES.	INFERIOR or Third Quality.			GOOD or Second Quality.			PRIME or First Quality.		
	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.
Carlisle - -	2181	s. d. 3 4 $\frac{1}{2}$	s. d. 26 10	2317	s. d. 3 10	s. d. 30 8	3,930	s. d. 4 3 $\frac{3}{4}$	s. d. 34 6
Leeds - -	17	3 6	28 0	162	3 7 $\frac{1}{4}$	28 10	1,351	4 0 $\frac{1}{4}$	32 2
Liverpool - -	212	3 0 $\frac{3}{4}$	24 6	1,056	3 9	30 0	6,742	4 2 $\frac{1}{4}$	33 6
London - -	56	3 3 $\frac{1}{2}$	26 4	1,463	4 2 $\frac{1}{2}$	33 8	3,747	4 9	38 0
Newcastle - -	29	3 6 $\frac{1}{2}$	28 4	467	4 1	32 8	2,230	4 6 $\frac{1}{4}$	36 2
Shrewsbury - -	291	3 6 $\frac{1}{4}$	28 2	765	3 10 $\frac{3}{4}$	31 2	656	4 4 $\frac{1}{4}$	34 10
Aberdeen - -	4,867	3 2	25 4	9,475	4 1 $\frac{1}{4}$	33 2	8,452	4 7 $\frac{1}{4}$	36 10
Dundee - -	992	3 3 $\frac{1}{2}$	26 4	4,556	4 1 $\frac{1}{4}$	32 10	3,273	4 4 $\frac{3}{4}$	35 2
Edinburgh - -	8	3 9	30 0	11,572	4 3 $\frac{3}{4}$	34 6	961	4 6 $\frac{3}{4}$	36 6
Falkirk - -	280	3 8	29 4	1,656	4 1 $\frac{1}{4}$	33 2	2,007	4 4 $\frac{3}{4}$	35 2
Glasgow - -	1,365	3 11 $\frac{1}{2}$	31 8	3,965	4 1 $\frac{1}{2}$	33 0	8,984	4 5	35 4
Perth - -	51	3 9 $\frac{1}{4}$	30 2	510	4 1 $\frac{1}{2}$	33 0	1,115	4 5 $\frac{1}{4}$	35 6

The year's average for prime cattle ranged, it will be seen, from 4s. 0 $\frac{1}{4}$ d. per stone (32s. 2d. per cwt.) at Leeds, to 4s. 9d. per stone (38s. per cwt.) in London. For second quality beasts the range was from 3s. 7 $\frac{1}{4}$ d. per stone (28s. 10d. per cwt.) at Leeds to 4s. 3 $\frac{3}{4}$ d. per stone (34s. 6d. per cwt.) at Edinburgh. For third quality cattle the lowest average was 3s. 0 $\frac{3}{4}$ d. (24s. 6d. per cwt.) at Liverpool, and the highest, 3s. 11 $\frac{1}{2}$ d. (31s. 8d.), at Glasgow.

Comparing these price quotations with those recorded for 1898, the figures are as follows :—

PLACES.	INFERIOR or Third Quality.		GOOD or Second Quality.		PRIME or First Quality.	
	1899.	1898.	1899.	1898.	1899.	1898.
	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
Carlisle - -	26 10	25 10	30 8	29 10	34 6	32 10
Leeds - - -	28 0	28 0	28 10	29 4	32 2	32 0
Liverpool - -	24 6	24 0	30 0	28 0	33 6	31 10
London - - -	26 4	25 2	33 8	32 4	38 0	36 6
Newcastle - -	28 4	26 0	32 8	29 10	36 2	33 4
Shrewsbury - -	28 2	24 6	31 2	29 8	34 10	34 2
Aberdeen - -	25 4	23 10	33 2	31 8	36 10	34 8
Dundee - - -	26 4	26 10	32 10	31 4	35 2	33 8
Edinburgh - -	30 0	28 10	34 6	32 8	36 6	34 0
Falkirk - - -	29 4	28 2	33 2	31 10	35 2	34 0
Glasgow - - -	31 8	31 0	33 0	32 2	35 4	33 10
Perth - - -	30 2	30 2	33 0	32 4	35 6	34 8

Taken as a whole this comparison shows a distinct improvement in values during 1899 as compared with 1898. At every place the average price per cwt. for prime cattle was higher, and, except at Leeds, the advance occurs also generally in second quality beasts. The difference of price was not so marked in third quality animals, but the paucity of the numbers accounted for in this class prevents any great stress being laid upon the figures.

In the notes on the live weight returns which have appeared in the Journal during the past year an attempt has been made to utilise the ascertained prices, at the twelve places above referred to, as a basis for measuring the general movement of values, for first and second quality fat cattle respectively, throughout Great Britain as a whole. The calculations so arrived at for each month are brought together in the statement appended opposite.

While it must be admitted that a broader statistical basis, if it were obtainable, might be desirable for an average of this

description, there seems no reason to suppose that, for purposes of comparison from month to month, the values here given fail to afford a reasonable index of the general course of trade at the cattle markets of Great Britain. These

MONTHS.	Good.		Prime.	
	Price per Stone.	Price per Cwt.	Price per Stone.	Price per Cwt.
	s. d.	s. d.	s. d.	s. d.
January - - - -	4 0 $\frac{3}{4}$	32 6	4 3 $\frac{3}{4}$	34 6
February - - - -	4 0 $\frac{1}{2}$	32 6	4 4	34 8
March - - - -	4 1 $\frac{1}{4}$	32 10	4 4 $\frac{1}{4}$	34 10
April - - - -	4 1 $\frac{3}{4}$	33 2	4 4 $\frac{3}{4}$	35 2
May - - - -	4 2	33 4	4 5 $\frac{1}{4}$	35 6
June - - - -	4 4 $\frac{3}{4}$	35 2	4 7 $\frac{1}{2}$	37 0
July - - - -	4 5	35 4	4 7 $\frac{3}{4}$	37 0
August - - - -	4 2	33 4	4 5 $\frac{1}{4}$	35 6
September - - - -	4 0 $\frac{1}{2}$	32 4	4 3 $\frac{3}{4}$	34 2
October - - - -	4 0 $\frac{1}{2}$	32 4	4 3 $\frac{1}{4}$	34 2
November - - - -	4 2	33 4	4 4 $\frac{3}{4}$	35 2
December - - - -	4 3 $\frac{1}{2}$	34 4	4 7 $\frac{3}{4}$	37 2

figures show a fairly steady improvement in value during the spring, the level of prices being apparently highest in July. During the autumn there was a marked fall, the lowest prices of the year being recorded in September and October, although this was again followed by a recovery in the last two months.

In commenting on these Returns for 1898 allusion was made to the fact that the number of fat cattle which were reported as having been actually sold by live weight at an agreed on price per cwt. or per stone had in that year reached 13,031, an increase of over 100 per cent. on the preceding year.* It is satisfactory to find that in 1899 such transactions appear to have been even more numerous, the numbers of fat cattle thus sold being returned as 16,844. These sales occurred in Glasgow, Falkirk, Dundee, Edinburgh, Wakefield, London, Liverpool, and Newcastle, two other markets—Birmingham and Leicester—also reporting isolated transactions conducted on this method. In addition there were also 576 store cattle sold by actual live weight at

* *Journal Vol. V., No. 4, p. 541.*

the markets of Glasgow, Edinburgh, Leicester, York, Bristol, and Dundee.

The total number of store cattle which in 1899 were weighed at the scheduled markets, and for which prices were returned, was 10,137, of which 9,097 were sold at Shrewsbury. The prices realised ranged from 3s. 4 $\frac{3}{4}$ d. per stone (27s. 2d. per cwt.) to 4s. 3 $\frac{1}{4}$ d. per stone (34s. 2d. per cwt.).

The tables, to which reference has already been made, giving the details for the fourth quarter of 1899, and for the whole year, are appended.

I.—Number of Cattle entering, weighed, and priced at the scheduled Places in Great Britain in the Fourth Quarter of 1899 :—

Animals.	4th Quarter, 1899.	4th Quarter, 1898.
CATTLE :	No.	No.
Entering markets - - - - -	365,787	402,639
Weighed - - - - -	37,558	41,821
Prices returned - - - - -	33,447	36,789
Prices returned with quality distinguished -	28,595	30,939
SHEEP :		
Entering markets - - - - -	1,047,291	1,139,635
Weighed - - - - -	11,109	9,229
Prices returned with quality distinguished -	9,824	7,400
SWINE :		
Entering markets - - - - -	142,938	130,581
Weighed - - - - -	457	488
Prices returned with quality distinguished -	439	488

II.—Prices of Fat Cattle at the undermentioned Places in the fourth Quarter of 1899 :—

PLACES.	INFERIOR or Third Quality.			GOOD or Second Quality.			PRIME or First Quality.		
	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.
Carlisle - -	529	s. d. 3 3 $\frac{3}{4}$	s. d. 26 6	515	s. d. 3 10 $\frac{1}{2}$	s. d. 31 0	999	s. d. 4 6 $\frac{1}{2}$	s. d. 36 4
Leeds - -	3	3 6	28 0	36	3 7 $\frac{1}{2}$	29 0	377	4 0 $\frac{3}{4}$	32 6
Liverpool - -	15	3 0	24 0	486	3 9 $\frac{1}{2}$	30 4	2,810	4 2 $\frac{1}{2}$	33 6
London - -	22	3 3 $\frac{1}{2}$	26 4	378	4 2	33 4	774	4 10	38 8
Newcastle - -	—	—	—	231	4 1 $\frac{1}{2}$	33 0	113	4 5 $\frac{1}{2}$	35 10
Shrewsbury - -	165	3 7 $\frac{1}{2}$	28 10	287	3 11	31 4	178	4 5	35 4
Aberdeen - -	1,211	3 1	24 8	2,258	4 3 $\frac{1}{2}$	34 2	2,508	4 9 $\frac{1}{2}$	38 2
Dundee - -	422	3 1 $\frac{1}{2}$	24 10	917	4 2 $\frac{1}{2}$	33 6	706	4 6 $\frac{1}{2}$	36 6
Edinburgh - -	8	3 9	30 0	3,090	4 3 $\frac{1}{2}$	34 4	168	4 8 $\frac{1}{2}$	37 8
Falkirk - -	128	3 7 $\frac{1}{2}$	29 0	472	4 0	32 0	377	4 5 $\frac{1}{2}$	35 8
Glasgow - -	393	3 11	31 4	811	4 0 $\frac{1}{4}$	32 2	2,681	4 4 $\frac{1}{2}$	34 10
Perth - -	4	4 0 $\frac{1}{2}$	32 4	133	4 2	34 0	136	4 6 $\frac{1}{2}$	36 4

III.—Comparative statement of the prices of Fat Cattle at the undermentioned Places in the Fourth Quarters of 1899 and 1898 :—

PLACES.	INFERIOR or Third Quality.		GOOD or Second Quality.		PRIME or First Quality.	
	1899.	1898.	1899.	1898.	1899.	1898.
	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Carlisle - - -	26 6	26 0	31 0	29 10	36 4	33 4
Leeds - - -	28 0	28 0	29 0	29 6	32 6	32 0
Liverpool - -	24 0	—	30 4	27 4	33 6	31 4
London - -	26 4	27 2	33 4	31 8	38 8	36 6
Newcastle - -	—	26 2	33 0	29 6	35 10	33 8
Shrewsbury - -	28 10	—	31 4	—	35 4	—
Aberdeen - -	24 8	23 0	34 2	31 6	38 2	34 10
Dundee - -	24 10	27 0	33 6	31 8	36 6	34 0
Edinburgh - -	30 0	—	34 4	31 10	37 8	35 8
Falkirk - -	29 0	27 0	32 0	31 2	35 8	34 6
Glasgow - -	31 4	31 2	32 2	32 2	34 10	33 10
Perth - - -	32 4	30 2	34 0	32 8	36 4	34 10

IV.—Cattle, Sheep, and Swine, entering the Markets and Marts of the undermentioned Places, with the Number Weighed, as received from the Market Authorities in the **Fourth Quarter** of 1899, under the Markets and Fairs (Weighing of Cattle) Act, 1891 (54 & 55 Vict. c. 70).

PLACES.	Cattle.			Sheep.			Swine.		
	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.
ENGLAND.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Ashford - - -	3,347	12	—	25,837	4	—	6,825	—	—
Birmingham - -	5,347	23	11	12,841	—	—	68,387	—	—
Bristol - - -	14,763	—	—	19,259	—	—	89	—	—
Carlisle - - -	17,542	2,043	2,043	71,292	—	—	5,925	—	—
Leicester - - -	14,313	398	322	24,093	25	25	2,341	—	—
Leeds - - -	8,132	416	416	25,288	—	—	1350	—	—
Lincoln - - -	2,486	—	—	13,394	—	—	2,929	—	—
Liverpool - - -	23,379	3,311	3,311	76,570	1,786	1,786	—	—	—
London - - -	24,720	3,866	1,174	103,764	1,275	30	20	—	—
Newcastle-upon-Tyne	26,145	344	344	80,258	—	—	19,717	350	350
Norwich - - -	42,134	31	—	25,749	—	—	7,926	—	—
Salford - - -	35,610	542	—	95,056	—	—	1,299	—	—
Shrewsbury - - -	13,824	3,906	3,894	21,533	—	—	9,475	—	—
Wakefield - - -	21,198	1,034	330	44,700	—	—	2,197	18	—
York - - -	34,503	37	37	86,850	—	—	1,750	—	—
SCOTLAND.									
Aberdeen - - -	15,144	5,977	5,977	42,687	6,330	6,330	4,337	—	—
Dundee - - -	4,298	2,093	2,093	8,854	1,035	1,035	963	1	1
Edinburgh - - -	20,819	7,031	*3,380	55,061	—	—	2,301	—	—
Falkirk - - -	2,449	977	977	3,116	—	—	45	—	—
Glasgow - - -	24,687	4,035	4,013	118,686	95	59	1,619	—	—
Perth - - -	10,947	1,482	*273	92,403	559	559	3,443	88	88
TOTAL for ENGLAND	287,443	15,963	11,882	726,484	3,090	1,841	130,230	368	350
TOTAL for SCOTLAND	78,344	21,595	*16,713	320,807	8,019	7,983	12,708	89	89
Total - -	365,787	37,558	*28,595	1,047,291	11,109	9,824	142,938	457	439

* Prices for 3,643 cattle in addition to the above were quoted from Edinburgh and for 1,209 cattle from Perth, but without distinguishing the quality.

V.—Cattle, Sheep, and Swine entering the Markets and Marts of the undermentioned Places, with the Number Weighed as received from the Market Authorities under the Markets and Fairs (Weighing of Cattle) Act, 1891 (54 and 55 Vict. c. 70) in the **Year 1899.**

PLACES.	Cattle.			Sheep.			Swine.		
	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weighed for which Prices were given.
ENGLAND.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Ashford - - -	12,495	159	—	112,064	55	—	21,900	—	—
Birmingham - -	28,282	32	20	87,762	—	—	213,962	—	—
Bristol - - -	49,870	24	24	104,253	—	—	89	—	—
Carlisle - - -	61,874	8,428	8,428	314,438	—	—	17,837	—	—
Leicester - - -	58,049	1,039	863	80,626	33	33	7,162	—	—
Leeds - - -	34,025	1,530	1,530	130,818	2,563	2,563	5,632	—	—
Lincoln - - -	8,102	8	8	61,998	—	—	11,314	—	—
Liverpool - - -	62,105	8,010	8,010	382,539	4,974	4,974	—	—	—
London - - -	83,590	13,452	5,266	546,659	6,296	183	20	—	—
Newcastle-upon-Tyne	97,001	2,726	2,726	357,926	—	—	49,417	1,721	1,721
Norwich - - -	115,587	221	2	208,804	—	—	30,249	—	—
Salford - - -	117,833	1,883	—	558,240	20	—	4,087	6	—
Shrewsbury - -	48,212	12,551	10,809	95,807	15	—	30,504	—	—
Wakefield - - -	79,740	3,116	1,020	223,464	130	—	16,205	135	6
York - - -	88,871	45	45	195,054	10	10	3,307	—	—
SCOTLAND.									
Aberdeen - - -	53,506	22,822	22,822	208,559	26,406	26,406	16,426	—	—
Dundee - - -	17,501	9,005	8,924	31,955	5,838	5,804	2,636	5	5
Edinburgh - -	71,703	26,508	*12,922	232,152	30	—	8,042	—	—
Falkirk - - -	10,725	3,943	3,943	10,358	—	—	106	—	—
Glasgow - - -	83,986	14,882	14,575	440,718	215	123	6,008	3	3
Perth - - -	53,934	9,098	*1,676	297,408	2,058	2,058	10,153	335	335
TOTAL for ENGLAND	945,636	53,224	38,751	3,460,452	14,096	7,763	411,685	1,862	1,727
TOTAL for SCOTLAND	290,455	86,258	*64,862	1,221,150	34,547	34,391	43,371	343	343
Total - -	1,236,091	139,482	*103,613	4,681,602	48,643	42,154	455,056	2,205	2,070

* Prices for 13,517 cattle in addition to the above were quoted from Edinburgh, and for 7,422 Cattle from Perth, but without distinguishing the quality.

PRICES OF MEAT, CORN, AND DAIRY PRODUCE.

AVERAGE PRICES of DEAD MEAT, per Stone of 8 lbs., at the LONDON CENTRAL MEAT MARKET, during the Fourth Quarter of 1899, and during the Months of December, 1898, and January and February, 1900.

(Compiled from the prices quoted weekly in the Meat Trades' Journal.)

DESCRIPTION.	4TH QUARTER 1899.	DECEMBER 1899.	JANUARY 1900.	FEBRUARY. 1900.
BEEF :—	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
Scotch, short sides - - - -	4 4 to 4 8	4 4 to 4 8	4 4 to 4 7	4 3 to 4 6
„ long sides - - - -	4 0 „ 4 3	4 1 „ 4 3	4 0 „ 4 3	3 11 „ 4 2
English - - - -	3 7 „ 3 11	3 7 „ 4 0	3 10 „ 4 1	3 10 „ 4 1
Cows and Bulls - - - -	1 10 „ 2 11	2 0 „ 3 2	2 3 „ 3 2	2 2 „ 3 2
American Birkenhead killed - -	3 6 „ 3 9	3 6 „ 3 9	3 8 „ 3 11	3 8 „ 3 11
„ Deptford killed - - -	3 6 „ 3 10	3 7 „ 3 10	3 8 „ 4 0	3 8 „ 3 11
Argentine „ „ - - -	3 4 „ 3 5	— „ 3 4	3 4 „ 3 8	3 2 „ 3 6
American Refrig. hind-quarters -	3 8 „ 3 11	3 8 „ 3 11	3 11 „ 4 2	3 9 „ 4 0
„ „ fore-quarters - -	2 5 „ 2 7	2 6 „ 2 8	2 8 „ 2 10	2 9 „ 2 11
Australian, Frozen hind-quarters -	2 1 „ 2 3	2 1 „ 2 3	2 2 „ 2 4	2 3 „ 2 4
„ „ fore-quarters - -	1 11 „ 2 0	2 0 „ 2 1	2 1 „ 2 2	2 1 „ 2 2
New Zealand „ hind-quarters -	2 4 „ 2 6	2 4 „ 2 6	2 4 „ 2 7	2 5 „ 2 7
„ „ fore-quarters - -	2 0 „ 2 2	2 1 „ 2 2	2 2 „ 2 3	2 2 „ 2 3
MUTTON :—				
Scotch, Prime - - - -	4 2 „ 4 7	4 0 „ 4 7	4 2 „ 4 7	4 3 „ 4 7
English, Prime - - - -	4 0 „ 4 6	4 0 „ 4 6	4 0 „ 4 6	4 2 „ 4 5
Ewes - - - -	2 10 „ 3 4	2 8 „ 3 2	2 9 „ 3 3	3 1 „ 3 6
Continental - - - -	3 5 „ 3 10	3 5 „ 3 10	3 7 „ 4 0	3 11 „ 4 4
River Plate, Town killed - - -	3 3 „ 3 6	3 2 „ 3 5	3 0 „ 3 4	3 3 „ 3 5
New Zealand, Frozen - - - -	1 9 „ 2 5	1 9 „ 2 4	1 10 „ 2 3	1 9 „ 2 2
Australian, Frozen - - - -	1 7 „ 1 9	1 7 „ 1 9	1 9 „ 1 10	1 9 „ 1 10
River Plate, Frozen - - - -	1 8 „ 1 9	— „ 1 9	— „ 1 10	1 9 „ 1 11
LAMB :—				
English - - - -	4 2 „ 4 10	— „ —	— „ —	5 11 „ 7 0
New Zealand, Frozen - - - -	2 7 „ 2 10	2 11 „ 3 1	3 0 „ 3 1	3 0 „ 3 2
VEAL :—				
English - - - -	4 „ 4 9	4 5 „ 4 10	4 2 „ 4 8	4 5 „ 4 9
Foreign - - - -	3 9 „ 4 2	3 10 „ 4 3	3 7 „ 4 1	3 10 „ 4 3
PORK :—				
English, best - - - -	3 6 „ 3 11	3 5 „ 3 10	3 3 „ 3 8	3 5 „ 3 10
„ secondary - - - -	3 0 „ 3 5	2 11 „ 3 5	2 9 „ 3 2	3 0 „ 3 4
Foreign - - - -				

AVERAGE PRICES OF DEAD MEAT, per Stone of 8 lbs., at the
LONDON CENTRAL MEAT MARKET, during the Years
1895 to 1899 inclusive.

(Compiled from the prices quoted weekly in the "Meat Trades
Journal.")

DESCRIPTION.	1895.				1896.				1897.				1898.				1899.			
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
BEEF :—																				
Scotch, short sides - -	4	3	to 4	6	4	0	to 4	4	4	2	to 4	5	3	11	to 4	3	4	3	to 4	6
„ long sides - -	3	10	„ 4	1	3	7	„ 3	10	3	10	„ 4	1	3	8	„ 3	10	3	11	„ 4	1
English - - -	3	9	„ 4	0	3	6	„ 3	9	3	8	„ 3	10	3	6	„ 3	8	3	9	„ 3	11
Cows and Bulls - -	2	3	„ 3	1	1	10	„ 2	8	2	1	„ 2	11	2	0	„ 2	8	2	0	„ 2	10
American, Birkenh'd killed	3	4	„ 3	7	2	11	„ 3	3	3	3	„ 3	6	3	1	„ 3	5	3	5	„ 3	8
„ Deptford killed	3	4	„ 3	8	2	11	„ 3	3	3	3	„ 3	6	3	2	„ 3	5	3	6	„ 3	9
Argentine „ „	2	11	„ 3	5	2	2	„ 2	8	2	8	„ 3	1	2	7	„ 2	11	3	0	„ 3	4
American Refrig. hind-qrs	3	7	„ 4	0	3	2	„ 3	7	3	6	„ 3	9	3	6	„ 3	9	3	7	„ 3	10
„ „ fore-qrs.	2	2	„ 2	6	1	10	„ 2	1	2	3	„ 2	5	2	2	„ 2	5	2	4	„ 2	6
Australi'n, Froz'n hind-qrs	2	1	„ 2	3	1	8	„ 1	10	2	1	„ 2	3	1	11	„ 2	1	2	1	„ 2	4
„ „ fore-qrs.	1	7	„ 1	8	1	3	„ 1	4	1	7	„ 1	9	1	6	„ 1	8	1	8	„ 1	9
New Zealand, hind-qrs. -	—	—	—	—	—	—	—	—	—	—	—	—	2	2	„ 2	4	2	3	„ 2	6
„ „ fore-qrs. -	—	—	—	—	—	—	—	—	—	—	—	—	1	8	„ 1	10	1	9	„ 1	11
MUTTON :—																				
Scotch, Prime - - -	4	9	„ 5	1	4	2	„ 4	7	4	4	„ 4	10	4	1	„ 4	8	4	5	„ 4	11
English, Prime- - -	4	5	„ 4	10	3	10	„ 4	4	4	2	„ 4	7	3	10	„ 4	5	4	2	„ 4	8
Ewes - - -	3	5	„ 3	10	2	9	„ 3	3	3	1	„ 3	6	2	9	„ 3	3	3	1	„ 3	6
Continental - - -	4	0	„ 4	4	3	5	„ 3	10	3	9	„ 4	1	3	7	„ 3	11	3	9	„ 4	2
River Plate, Town killed-	3	2	„ 3	7	3	0	„ 3	3	3	3	„ 3	5	3	0	„ 3	3	3	3	„ 3	6
New Zealand, Frozen -	2	2	„ 2	7	1	11	„ 2	5	1	10	„ 2	4	1	9	„ 2	6	1	11	„ 2	8
Australian, Frozen -	1	10	„ 2	0	1	7	„ 1	8	1	7	„ 1	9	1	8	„ 1	10	1	10	„ 2	0
River Plate, Frozen -	1	10	„ 2	0	1	7	„ 1	9	1	7	„ 1	9	1	8	„ 1	9	1	11	„ 2	0
LAMB :—																				
English - - -	5	6	„ 6	5	5	1	„ 6	1	5	4	„ 6	2	4	10	„ 5	9	5	0	„ 6	2
New Zealand, Frozen -	2	10	„ 3	4	2	9	„ 3	3	2	9	„ 3	1	3	1	„ 3	5	2	11	„ 3	3
VEAL :—																				
English - - -	4	1	„ 4	8	4	0	„ 4	8	3	11	„ 4	6	4	2	„ 4	7	4	4	„ 4	9
Foreign - - -	3	10	„ 4	6	3	4	„ 3	11	3	4	„ 3	10	3	7	„ 4	0	3	8	„ 4	2
PORK :—																				
English, best - - -	3	4	„ 3	8	3	0	„ 3	5	3	10	„ 4	2	3	11	„ 4	3	3	6	„ 3	11
„ secondary -	2	8	„ 3	2	2	5	„ 2	11	3	2	„ 3	7	3	5	„ 3	10	3	0	„ 3	5
Foreign - - -																				

AVERAGE WHOLESALE PRICES of CATTLE and SHEEP, per Stone of 8 lbs., sinking the offal, at the METROPOLITAN CATTLE MARKET, during each Quarter of 1899, with the Mean Prices for the Year.

PERIOD.	CATTLE.			SHEEP.		
	Inferior.	Second.	First.	Inferior.	Second.	First.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
1st Quarter, 1899	2 6	3 11	4 6	3 5	4 11	5 8
2nd Quarter, „	2 7	3 11	4 6	3 4	5 1	5 9
3rd Quarter, „	2 4	3 11	4 7	3 3	4 11	5 8
4th Quarter, „	2 7	3 11	4 9	3 4	5 0	5 8
The Year „	2 6	3 11	4 7	3 4	5 0	5 8

AVERAGE WHOLESALE PRICES OF BEEF and MUTTON, per Stone of 8 lbs., by the Carcase, at LIVERPOOL and GLASGOW, during each Quarter of 1899, with the Mean Prices for the Year.

PERIOD.	LIVERPOOL.*				GLASGOW.†			
	BEEF.		MUTTON.		BEEF.		MUTTON.	
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
1st Quarter, 1899	2 6 to 3	3 9	4 2 to 4	10	2 10 to 3	8	3 8 to 4	4
2nd Quarter, „	2 4 „ 3	8	4 0 „ 5	4	3 0 „ 4	2	4 4 „ 5	4
3rd Quarter, „	2 4 „ 3	8	3 0 „ 5	0	2 4 „ 3	8	3 4 „ 4	4
4th Quarter, „	2 6 „ 4	0	3 0 „ 4	8	2 8 „ 3	8	3 4 „ 4	4
The Year „	2 5 „ 3	9	3 6 „ 4	11	2 8 „ 3	9	3 8 „ 4	7

* Compiled from information furnished by the Medical Officer of Health, Liverpool. The prices quoted are for Carcases of Animals *slaughtered at the Liverpool Abattoir*, and do not apply to Imported Meat.

† Compiled from information furnished by the Principal of the Veterinary College, Glasgow.

BERLIN MARKET.

AVERAGE PRICES of CATTLE and SHEEP (First Quality Dead Weight) in the BERLIN CATTLE MARKET in the under-mentioned Months of 1899 and 1900, together with the mean Prices for the Year 1899.

MONTHS.	CATTLE.		SHEEP.	
	Per Cwt.		Per Cwt.	
December, 1899 - - -	s. d.	s. d.	s. d.	s. d.
	63 1	to 67 2	62 9	to 65 10
Mean of the Year 1899 - - -	62 2	„ 66 5	60 7	„ 63 0
January, 1900 - - -	63 5	„ 67 5	61 1	„ 64 3
February, 1900 - - -	62 10	„ 66 5	61 1	„ 64 3

NOTE.—The above prices have been compiled from the weekly returns published in the *Deutsche Landwirtschaftliche Presse*.

PARIS MARKET.

AVERAGE PRICES of CATTLE, SHEEP, and SWINE (Medium Quality) in the PARIS CATTLE MARKET in the under-mentioned Months of 1899 and 1900, together with the mean Prices for the Year 1899.

MONTHS.	OXEN.	CALVES.	SHEEP.	PIGS.
	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.
LIVE WEIGHT.				
December, 1899 - - -	s. d. 27 8	s. d. 41 2	s. d. 30 11	s. d. 40 4
Mean of the Year 1899 - - -	30 0	41 9	33 7	41 9
January, 1900 - - -	26 6	41 9	31 9	40 9
February, 1900 - - -	26 8	40 9	33 8	40 11
DEAD WEIGHT.				
December, 1899 - - -	s. d. 45 10	s. d. 68 9	s. d. 62 5	s. d. 57 3
Mean of the Year 1899 - - -	50 1	69 5	67 10	59 8
January, 1900 - - -	44 5	69 11	63 9	58 0
February, 1900 - - -	44 7	68 4	66 7	58 3

NOTE.—The above prices have been compiled from the weekly returns published in the *Journal d'Agriculture Pratique*.

CHICAGO.

PRICES of CATTLE at CHICAGO per Cwt. (Live Weight) in the under-mentioned Months of 1899 and 1900, with the Mean Prices for the Year 1899.

Months.	Good Dressed Beef and Shipping Steers.		Export Cattle.		Extra Prime Cattle.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
December, 1899	24 3	to 28 7	24 3	to 30 3	31 9	to 34 6
Mean of the year 1899	23 10	„ 26 10	23 9	„ 27 8	27 10	„ 29 9
January, 1900	23 10	„ 28 9	24 7	„ 30 4	31 0	„ 33 3
February „	22 1	„ 26 3	22 11	„ 27 8	28 10	„ 29 7

Compiled from the Live Stock Reports issued by Messrs. Clay, Robinson, and Co., of the Union Stock Yards, Chicago, Illinois.

AVERAGE VALUES, per Cwt., of various Kinds of DEAD MEAT Imported into the United Kingdom from FOREIGN COUNTRIES and BRITISH POSSESSIONS in each Quarter of 1899, with the Average Values for the Year.

(Computed from the Trade and Navigation Accounts.)

PERIOD.	BEEF.		MUTTON.	PORK.		BACON.	HAMS.
	Fresh.	Salted.	Fresh.	Fresh.	Salted.		
1st Quarter, 1899	s. d. 39 4	s. d. 26 1	s. d. 30 6	s. d. 40 10	s. d. 24 5	s. d. 34 3	s. d. 38 7
2nd Quarter „	39 6	26 6	32 6	41 9	20 2	35 4	38 9
3rd Quarter „	38 0	24 2	31 3	42 9	19 6	36 3	43 2
4th Quarter „	37 11	27 2	31 10	42 10	21 11	37 9	45 2
The Year „	38 8	25 11	31 7	41 11	21 6	35 10	41 5

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels,* computed from the Weekly Averages of Corn Returns from the 196 Returning Markets of ENGLAND AND WALES, pursuant to the Corn Returns Act, 1882, together with the QUANTITIES returned as sold at such Markets, in the under-noted periods of the Years 1899, 1898, and 1897.

QUARTER ENDED	PRICES.			QUANTITIES.		
	1899.	1898.	1897.	1899.	1898.	1897.
Wheat.						
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
Lady Day - - -	26 3	35 1	29 7	868,579	699,657	619,679
Midsummer - - -	25 1	41 5	27 6	994,293	557,504	619,618
Michaelmas - - -	25 2	32 8	30 4	754,667	308,279	635,698
Christmas - - -	26 4	27 2	33 3	913,421	1,036,975	881,566
Barley.						
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
Lady Day - - -	27 1	27 9	24 0	830,398	902,452	784,713
Midsummer - - -	24 6	26 10	21 4	92,648	47,621	78,488
Michaelmas - - -	24 4	25 10	21 6	237,935	99,743	118,875
Christmas - - -	26 6	28 2	27 0	2,135,762	2,603,841	2,275,111
Oats.						
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
Lady Day - - -	16 11	17 5	16 4	251,841	226,150	194,193
Midsummer - - -	17 6	19 10	17 3	137,834	93,475	79,707
Michaelmas - - -	17 3	19 7	17 10	147,902	78,787	75,824
Christmas - - -	16 4	16 11	16 5	236,783	289,952	200,710

* Section 8 of the Corn Returns Act, 1882, provides that where returns of purchases of British Corn are made to the local inspector of Corn Returns in any other measure than the imperial bushel, or by weight or by a weighed measure, that officer shall convert such returns into the imperial bushel, and in the case of weight or weighed measure the conversion is to be made at the rate of 60 imperial pounds for every bushel of wheat, 50 imperial pounds for every bushel of barley, and 39 imperial pounds for every bushel of oats.

CORN PRICES :—ANNUAL AVERAGES.

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Weekly Averages of Corn Returns from the 196 Returning Markets, together with the QUANTITIES returned as sold at such Markets during each of the years 1895 to 1899.

YEARS.	PRICES.			QUANTITIES.		
	Wheat.	Barley.	Oats.	Wheat.	Barley.	Oats.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>Quarters.</i>	<i>Quarters.</i>	<i>Quarters.</i>
1895 - - -	23 1	21 11	14 6	1,928,383	3,426,576	665,939
1896 - - -	26 2	22 11	14 9	2,111,021	3,391,862	655,153
1897 - - -	30 2	23 6	16 11	2,756,561	3,257,187	559,434
1898 - - -	34 0	27 2	18 5	2,602,416	3,653,657	688,064
1899 - - -	25 8	25 7	17 0	3,530,961	3,296,744	776,361

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Returns received under the Corn Returns Act, 1882, in each of the under-mentioned Weeks in 1900, and in the corresponding Weeks in 1899 and 1898.

Weeks ended (<i>in 1900</i>).	Wheat.			Barley.			Oats.		
	1900.	1899.	1898.	1900.	1899.	1898.	1900.	1899.	1898.
Jan. 6	s. d. 25 9	s. d. 27 0	s. d. 34 11	s. d. 25 7	s. d. 28 3	s. d. 27 9	s. d. 16 2	s. d. 17 0	s. d. 16 10
" 13	25 11	27 2	35 0	25 5	28 2	27 8	16 3	17 1	17 4
" 20	26 0	27 0	34 11	25 8	27 11	27 10	16 2	17 1	17 5
" 27	25 10	26 7	34 6	25 9	27 9	27 8	16 4	17 0	17 2
Feb. 3	25 8	26 6	34 10	25 4	27 2	28 0	16 6	17 0	17 6
" 10	25 10	26 8	35 1	25 3	27 2	27 8	16 5	17 0	17 5
" 17	26 1	26 0	35 0	24 11	26 10	27 11	16 8	16 11	17 8
" 24	26 3	25 7	35 5	25 1	26 7	27 6	16 9	16 11	17 10
Mar. 3	26 4	25 8	35 10	24 6	26 7	28 0	16 10	17 0	17 11
" 10	25 11	25 10	35 8	24 8	26 7	27 10	16 11	16 11	17 9
" 17	25 10	25 10	35 6	24 6	26 3	28 0	16 11	16 10	17 10
" 24	-	25 4	35 4	-	26 8	28 6	-	17 0	17 8
" 31	-	24 11	35 3	-	26 2	27 11	-	16 11	17 10
Apr. 7	-	24 7	35 2	-	25 1	27 0	-	16 11	17 11
" 14	-	24 6	35 3	-	25 7	28 0	-	16 10	18 2
" 21	-	24 8	36 1	-	25 2	28 3	-	17 1	18 4
" 28	-	25 0	38 4	-	25 10	27 10	-	17 5	18 11
May 5	-	25 3	42 4	-	24 5	27 8	-	17 6	20 4
" 12	-	25 4	45 11	-	23 11	27 1	-	17 9	21 1
" 19	-	25 3	48 1	-	23 11	26 0	-	17 10	21 3
" 26	-	25 2	47 9	-	23 8	26 5	-	17 8	21 5
June 2	-	25 4	46 3	-	24 4	26 10	-	18 1	21 0
" 9	-	25 6	45 4	-	21 10	25 8	-	18 2	20 11
" 16	-	25 7	42 4	-	23 1	26 1	-	17 10	20 5
" 23	-	25 7	40 8	-	26 2	24 3	-	17 11	20 7
" 30	-	25 7	38 3	-	24 2	23 4	-	18 0	20 8
July 7	-	25 7	36 10	-	21 9	25 0	-	18 1	20 5
" 14	-	25 5	37 1	-	20 4	24 1	-	17 11	20 10
" 21	-	25 5	38 1	-	21 10	25 0	-	18 0	20 10
" 28	-	25 2	36 11	-	22 5	24 2	-	18 2	20 11
Aug. 4	-	24 10	35 7	-	20 9	26 11	-	18 0	20 7
" 11	-	24 8	33 8	-	22 6	27 5	-	17 9	20 9
" 18	-	24 7	32 7	-	26 11	24 4	-	17 4	19 11
" 25	-	24 7	30 7	-	26 5	27 6	-	17 1	19 3
Sept. 1	-	25 0	28 1	-	25 10	27 8	-	16 7	18 11
" 8	-	25 5	26 10	-	26 5	27 9	-	16 6	17 10
" 15	-	25 4	25 7	-	27 1	26 10	-	16 2	16 10
" 22	-	25 4	25 5	-	27 4	26 9	-	16 1	17 1
" 29	-	25 6	25 9	-	26 11	27 0	-	16 5	16 7
Oct. 6	-	26 0	26 6	-	28 0	27 5	-	16 5	16 7
" 13	-	27 3	26 6	-	27 9	27 11	-	16 5	16 6
" 20	-	28 2	26 8	-	27 6	28 1	-	16 10	16 6
" 27	-	28 1	27 4	-	27 4	28 8	-	16 3	16 8
Nov. 3	-	27 2	28 4	-	27 2	28 6	-	16 7	17 2
" 10	-	26 7	28 4	-	26 9	28 7	-	16 5	17 5
" 17	-	26 1	28 1	-	26 4	28 5	-	16 7	17 2
" 24	-	25 8	27 9	-	26 2	28 4	-	16 7	17 1
Dec. 1	-	25 7	27 7	-	25 10	28 6	-	16 6	17 1
" 8	-	25 7	27 6	-	25 10	28 6	-	16 5	17 3
" 15	-	25 4	27 2	-	25 7	28 5	-	16 1	17 0
" 22	-	25 6	26 9	-	25 10	28 6	-	16 0	17 0
" 29	-	25 9	26 11	-	25 5	28 4	-	16 2	17 0

AVERAGE VALUE per IMPERIAL QUARTER OF WHEAT IMPORTED into the UNITED KINGDOM from the under-mentioned Foreign Countries and British Possessions in the years 1897, 1898, and 1899.

COUNTRIES from which Exported.	Average Value per Imperial Quarter.		
	1897.	1898.	1899.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
ARGENTINE REPUBLIC - - -	29 3	37 6	27 4
CHILE - - - - -	31 5	35 1	27 5
GERMANY - - - - -	30 10	36 5	28 0
ROUMANIA - - - - -	29 9	35 9	29 6
RUSSIA - - - - -	31 0	34 11	28 8
TURKEY - - - - -	30 1	31 3	25 6
U.S OF AMERICA { Atlantic - - -	33 0	34 7	29 4
Pacific - - -	31 0	34 11	28 7
INDIA, BRITISH - - - - -	36 2	31 11	27 9
NORTH AMERICA, BRITISH - - -	33 4	33 4	29 5
AUSTRALASIA - - - - -	—	—	28 11

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in FRANCE, and ENGLAND and WALES in the under-mentioned Months of 1899 and 1900.

MONTH.	FRANCE.	ENGLAND.
WHEAT.		
	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>
December, 1899 - - - -	31 4	25 6
January, 1900 - - - -	31 6	25 10
February - - - - -	32 3	25 11
BARLEY.		
	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>
December, 1899 - - - -	23 2	25 8
January, 1900 - - - -	23 2	25 7
February - - - - -	23 3	25 1
OATS.		
	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>
December, 1899 - - - -	18 8	16 2
January, 1900 - - - -	18 8	16 2
February - - - - -	18 9	16 7

Note.—The prices of French grain have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*. The prices of British grain are official averages based on the weekly returns furnished under the Corn Returns Act, 1882.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in BELGIUM in the under-mentioned Months of 1899 and 1900, with the mean prices for the year 1899.

Month.	Wheat.	Barley.	Oats.
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
November, 1899- - -	27 7	24 8	18 5
December „ - - -	27 4	24 6	18 7
Mean of the year 1899 -	28 3	23 9	18 11
January, 1900 - - -	27 3	24 2	18 8

The above prices have been compiled from the official monthly averages published in the *Moniteur Belge*.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER at the under-mentioned Markets in the under-mentioned Months of 1899 and 1900, with the mean prices for the year 1899.

Month.	London.	Paris.	Breslau.
WHEAT.			
	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d. s. d.</i>
December 1899 - -	26 6	31 8	29 3 to 32 10
Mean of the year 1899	26 6	34 10	30 11 „ 34 8
January, 1900 - -	26 5	31 8	28 10 „ 32 6
February - - -	26 11	33 10	28 10 „ 32 6
BARLEY.			
	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d. s. d.</i>
December, 1899 - -	27 1	24 9	22 9 to 26 4
Mean of the year 1899	27 3	24 6	23 0 „ 26 7
January, 1900 - -	26 8	24 10	22 9 „ 26 4
February - - -	23 1	24 9	22 9 „ 26 4
OATS.			
	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d.</i>	Per Qr. <i>s. d. s. d.</i>
December, 1899 - -	16 11	19 3	16 3 to 17 3
Mean of the year 1899	17 8	19 9	17 3 „ 18 3
January, 1900 - -	17 0	19 3	16 3 „ 17 2
February - - -	17 4	19 11	16 2 „ 17 2

Note.—The London quotation represents the price of British corn as returned under the Corn Returns Act, 1882; the price of grain in Paris is the official average price of Fench grain in that city; the quotations shown for Breslau represent the prices of grain of good merchantable quality.

MEAN WHOLESALE PRICES of BUTTER, MARGARINE, and
CHEESE in the under-mentioned Months of 1899 and 1900.
(Compiled from the Grocer.)

DESCRIPTION.	December, 1899.			January, 1900.			February, 1900.		
	Per Cwt.			Per Cwt.			Per Cwt.		
	s.	d.	s. d.	s.	d.	s. a.	s.	d.	s. a.
BUTTER :									
Cork, 1sts - -	101	6	—	108	6	—	—	—	—
„ 2nds - -	95	0	—	98	0	—	101	0	—
„ 3rds - -	85	6	—	79	0	—	89	0	—
„ 4ths - -	78	0	—	72	0	—	75	0	—
Friesland - -	106	0 to 108	0	101	6 to 103	6	105	0 to 111	6
Dutch Factories - -	108	6,, 113	6	103	6,, 106	0	104	6,, 109	6
French Baskets - -	113	0,, 120	6	106	0,, 115	0	102	0,, 112	0
„ Crocks and Firkins - -	102	0,, 111	0	95	0,, 103	0	92	0,, 100	0
„ 2nds and 3rds - -	94	0,, 100	0	88	0,, 93	0	86	0,, 90	0
Danish and Swedish - -	119	0,, 123	0	109	6,, 114	0	108	6,, 110	6
Finnish - -	92	0,, 103	0	—	„ —	—	94	0,, 100	0
Russian - -	87	0,, 98	6	—	„ —	—	90	0,, 96	0
Canadian and States - -	71	0,, 103	0	76	0,, 100	0	—	„ —	—
Argentine - -	96	0,, 106	0	94	6,, 98	6	93	6,, 101	6
Colonial, fine- - -	95	0,, 106	0	90	0,, 101	0	93	6,, 102	0
„ good and inferior - -	75	0,, 90	0	72	6,, 87	0	71	6,, 91	0
Fresh Rolls (Foreign) per doz. - -	10	6,, 15	6	10	6,, 15	3	10	3,, 15	0
MARGARINE :									
Margarine - -	38	0,, 60	0	38	0,, 60	0	38	0,, 60	0
Mixtures - -	64	0,, 86	0	64	0,, 86	0	64	0,, 86	0
CHEESE :									
Cheddar - -	65	0,, 80	0	62	6,, 81	6	60	6,, 82	6
„ Loaf - -	69	0,, 74	0	71	6,, 75	0	72	0,, 76	0
Cheshire - -	75	0,, 84	0	71	6,, 82	6	71	6,, 82	0
Wiltshire - -	65	0,, 68	0	67	6,, 71	0	68	0,, 72	0
Double Gloucester - -	68	0,, 72	0	69	6,, 73	6	70	0,, 74	0

WEEKLY PRICES (WHOLESALE) of VEGETABLES and FRUIT
at COVENT GARDEN MARKET.(Compiled from the *Gardeners' Chronicle*.)

	Week ending							
	3rd February.		10th February.		17th February.		24th February.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
VEGETABLES—								
Artichokes, Globe, per doz.	4	0 to 6	0	4	0 to 4	6	3	0 —
Asparagus, English forced, per bundle	6	0	7	0	6	0	6	0 to 8
Beans, Channel Islands, per lb.	2	0	2	6	2	0	2	6
Beetroots, new, per doz.	0	6	1	0	0	6	1	0
Do., per bushel	1	3	2	0	1	3	2	0
Broccoli, Cornish, per crate	6	0	9	0	6	0	8	0
Brussels Sprouts, per sieve	1	0	1	6	1	3	2	6
Do., per bushel	2	0	2	6	2	0	2	6
Brussels Sprouts, Tops, per bushel	1	6	2	3	1	0	1	3
Cabbages, per tally	5	0	6	0	5	0	6	0
Do., per doz.	1	0	1	6	1	0	1	3
Do., Savoys, per tally	4	0	10	0	4	0	12	0
Carrots, English, per doz. bunches	2	0	2	6	3	0	3	6
Do., good, per cwt. bags, washed	3	0	3	6	4	0	4	0
Cauliflowers, per doz.	1	6	3	0	1	6	3	0
Do., Cornish crates	8	0	10	0	6	0	8	0
Celery, red, roll, per doz.	8	0	16	0	8	0	18	0
Colewort, per bushel	1	6	2	0	1	6	2	0
Cress, per doz. punnets	1	6	—	—	1	6	—	—
Cucumbers, per doz.	4	0	10	0	4	0	10	0
Garlic, new, per lb.	0	2	—	—	0	3	—	—
Do., per cwt.	14	0	—	—	13	0	16	0
Horseradish, English, per bundle	1	6	2	0	1	6	2	0
Leeks, per doz. bunches	1	6	2	0	1	6	2	0
Mint, new, Channel Islands, per dozen bunches	6	0	8	0	8	0	—	—
Mushrooms, House, per lb.	0	8	0	10	0	10	0	10
Onions, bags	5	0	6	0	5	0	6	0
Do., picklers, per sieve	2	6	3	0	2	6	3	0
Do., English, per c t.	6	0	6	6	6	0	6	6
Parsley, per doz. bunches	1	0	2	0	2	0	2	6
Do., per sieve	1	0	—	—	1	0	1	6
Parsnips, per doz.	0	6	1	0	0	6	1	0
Do., per bag	3	0	3	6	3	0	4	0
Potatoes, Old Varieties, per ton	60	0	90	0	60	0	90	0
Do., Dunbar Main Crop, per ton	100	0	110	0	100	0	110	0
Do., New Channel Islands, frames, per lb.	0	5½	0	8	0	7	0	9
Radishes, Long, per dozen	0	10	1	0	0	10	0	8
Do., round	1	6	—	—	1	0	1	6
Rhubarb, Yorks., per dozen bunches	1	3	1	6	1	3	1	6
Scotch Kale, per bushel	2	0	2	6	2	0	2	6
Seakale, per dozen punnets	12	0	15	0	12	0	16	0
Shallots, per lb.	0	3	—	—	0	3	—	—
Turnips, per dozen bunches	2	0	3	0	3	0	3	6
Turnip Tops, bags	2	0	2	6	2	0	3	6
FRUIT.								
Apples, Beefings, per bushel	5	0	6	0	4	0	5	0
Do., Blenheims, per bushel	5	0	6	0	4	0	5	0
Do., Northern Greenings, per bushel	4	6	5	6	3	6	4	0
Do., Queenings, per bushel	4	0	5	0	4	0	6	0
Do., Wellingtons, per bushel	5	0	7	0	5	0	7	0
Do., Various, per bushel	2	6	6	0	2	6	5	0
Cobnuts, per lb.	0	7½	—	—	0	8	0	9
Grapes, English, Alicante, per lb.	1	3	1	9	1	3	1	9

DISEASES OF ANIMALS IN GREAT BRITAIN.

NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Board of Agriculture, in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Pleuro- Pneumonia.			Swine-Fever.	
	OUTBREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUTBREAKS Confirmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>
September, 1898 -	—	—	—	550	8,017
December, 1898 -	—	—	—	507	8,921
March, 1899 -	—	—	—	594	8,077
June, 1899 -	—	—	—	917	10,799
September, 1899 -	—	—	—	453	6,645
December, 1899 -	—	—	—	358	5,276

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax** and **Glanders** in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).	
	OUTBREAKS Reported.	ANIMALS Attacked.	OUTBREAKS Reported.	ANIMALS Attacked.
	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>No.</i>
September, 1898 -	92	134	188	361
December, 1898 -	139	223	168	306
March, 1899 -	135	247	176	328
June, 1899 -	153	315	175	263
September, 1899 -	113	222	261	526
December, 1899 -	133	202	241	355

NUMBER OF CASES of **Rabies** in DOGS in GREAT BRITAIN during each of the under-mentioned periods.

THREE MONTHS ENDED					Number of Cases.
30th September, 1898	-	-	-	-	1
31st December, 1898	-	-	-	-	2
31st March, 1899	-	-	-	-	1
30th June, 1899	-	-	-	-	—
30th September, 1899	-	-	-	-	6
31st December, 1899	-	-	-	-	2

DISEASES OF ANIMALS IN IRELAND.

NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Lord Lieutenant and Privy Council in IRELAND, in each of the under-mentioned periods.

QUARTER ENDED	Pleuro-Pneumonia.			Swine-Fever.	
	OUT- BREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUT- BREAKS Con- firmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	No.	No.	No.	No.
September, 1898 -	—	—	—	105	1,269
December, 1898 -	—	—	—	42	496
March, 1899 -	—	—	—	80	1,356
June, 1899 -	—	—	—	95	1,541
September, 1899 -	—	—	—	119	2,463
December, 1899 -	—	—	—	28	495

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax**, **Glanders**, and **Rabies** in Ireland in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).		Rabies.	
	OUT- BREAKS REPORTED.	ANIMALS ATTACKED.	OUT- BREAKS REPORTED.	ANIMALS ATTACKED.	CASES REPORTED.	
					DOGS.	OTHER ANIMALS.
	No.	No.	No.	No.	No.	No.
Sept., 1898 -	1	3	2	4	31	12
Dec., 1898 -	—	—	3	3	30	5
March, 1899 -	1	1	—	—	20	5
June, 1899 -	—	—	4	6	22	3
September, 1899 -	1	3	2	4	30	5
December, 1899 -	—	—	3	4	7	1

PRICES OF WOOL.

PRICES OF ENGLISH WOOL, per pack of 240 lbs., in the
under-mentioned Months of 1899 and 1900.

(Compiled from the *Economist*.)

DESCRIPTION.	December, 1899.		January, 1900.		February, 1900.	
	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
South Down - -	9 0	to 14 0	9 0	to 14 0	8 10	to 13 10
Half-breds - -	8 0	„ 10 0	8 0	„ 10 0	7 15	„ 9 15
Leicester - -	8 0	„ 9 10	8 0	„ 9 10	7 10	„ 9 0
Kent Fleeces - -	7 10	„ 10 0	7 10	„ 10 0	7 5	„ 9 5

ORDNANCE SURVEY MAPS OF GREAT BRITAIN AND IRELAND.

The Ordnance Survey are issuing a new series of folding pocket maps for England and Wales on the scale of one inch to the mile. The maps are printed in colours on sheets 18 by 12 inches, mounted on canvas, in a cover or flat, price 1s. each. The one-inch scale map can also be procured at the same price in black and white, showing outline and contours; or in outline, with hills printed either in black or brown: the outline map has recently been revised. These maps are not only useful for general topographical purposes, but should also prove serviceable to cyclists and pedestrians, since they show all roads, indicating their character and whether metalled or not, footpaths, hills, rivers, towns, villages, railway stations, and local boundaries.

There are agents for the sale of Ordnance Survey Maps in most of the chief towns, and maps can be ordered and indexes, etc., seen at many Head Post Offices, in places where there are no agents. They can also be ordered, through any bookseller or railway bookstall, from the Director-General, Ordnance Survey Office, Southampton; or in the case of Ireland, from the Officer in Charge, Ordnance Survey, Dublin.

THE "LABOUR GAZETTE."

The "Labour Gazette," the Journal of the Labour Department of the Board of Trade, contains an article each month on the state of employment among agricultural labourers in the various parts of the United Kingdom. Special articles also appear therein from time to time on the rates of wages paid to agricultural labourers, the Hiring Fairs in Great Britain, and on migratory Irish agricultural labourers. The "Labour Gazette" is issued on the 15th of each month, and may be obtained direct from the Publishers, Messrs. Horace Marshall & Son, Temple House, Temple Avenue, London, E.C., at the rate of 2s. per annum, post free. Copies may also be ordered through any newsagent, price 1d. each.

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MEDICAL CERTIFICATES can be dispensed with for Insurances up to £25 inclusive.

PREMIUMS are payable by transfers from Savings Bank deposit accounts, and deposits can be made for the purpose at any Post Office Savings Bank. When the balance in the account is insufficient, the depositor will be informed accordingly in time to make a deposit. By means of the Penny Stamp Slips the provision can be made in sums of one penny at a time.

FRIENDLY SOCIETIES.—Members can pay their premiums through their Society, if the Society is willing to undertake the collection.

RESIDENCE ABROAD.—Permission is granted to persons over thirty years of age, who have been insured five years, to reside in any part of the world without the payment of any extra premium.

LAPSED INSURANCES.—MONEY NOT LOST.—If after paying two annual premiums the Insurance is discontinued, a surrender value is payable, or a “paid up” policy is issued for such an amount of Insurance as the premiums already paid may justify.

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FACILITIES FOR INVESTING IN THE FUNDS.

INVESTMENTS IN GOVERNMENT STOCK can be made through any Post Office Savings Bank of sums from one shilling to £200 Stock in any year ending 31st December until the maximum of £500 Stock has been reached; and money can be deposited for this purpose irrespective of ordinary Savings Bank deposits. The dividends are collected by the Post Office and added to the depositors' accounts without charge.

SALES.—A depositor who buys Stock in this way can sell the whole or part of it at any time through the Post Office Savings Bank.

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FURTHER PROVISIONS IN REGARD TO STOCK.—A depositor may, at a small cost, transfer Stock into his name at the Bank of England, or obtain a Stock Certificate with dividend coupons annexed.

LIST OF LEAFLETS ISSUED BY THE BOARD OF AGRICULTURE.

Number.	Title.
Leaflet No. 1	Mites on Currant and Nut Trees.
" " 2	Vine and Raspberry Weevils.
" " 3	The Turnip Fly or Flea.
" " 4	Caterpillars on Fruit Trees.
" " 5	The Mangel Wurzel Fly.
" " 6	The Field Vole.
" " 7	<i>Out of Print.</i>
" " 8	Farmers and Assessments to Local Rates.
" " 9	Ensilage.
" " 10	Wireworms.
" " 11	The Daddy Longlegs or Crane Fly
" " 12	The Gooseberry Saw-Fly.
" " 13	Acorn Poisoning.
" " 14	The Raspberry Moth.
" " 15	The Apple Blossom Weevil.
" " 16	The Apple Sucker.
" " 17	<i>Out of Print.</i>
" " 18	Fertilisers and Feeding Stuffs Act.
" " 19	Pea and Bean Weevil.
" " 20	The Magpie Moth.
" " 21	The Warble Fly.
" " 22	The Diamond Back Moth.
" " 23	Potato Disease.
" " 24	The Ribbon Footed Corn-Fly.
" " 25	The Cockchafer.
" " 26	Farmers and the Income Tax.
" " 27	Remission of Tithe Rentcharge.
" " 28	Anthrax.
" " 29	Swine Fever.
" " 30	The Codlin Moth.
" " 31	The Onion Fly.
" " 32	Foul Brood or Bee Pest.
" " 33	Surface Caterpillars.
" " 34	The Woolly Aphis or American Blight.
" " 35	The Celery Fly.
" " 36	Cultivation of Osiers.
" " 37	Rabies.
" " 38	The Carrot Fly.
" " 39	Assessments to Land Tax.
" " 40	The Kestrel or Windhover.
" " 41	The Red Spider or Spinning Mite.
" " 42	The Short-eared Owl.
" " 43	Titmice.
" " 44	The Common Lapwing or Plover
" " 45	The Starling.
" " 46	The Stem Eelworm.
" " 47	The Asparagus Beetle.
" " 48	The Pea Thrips.
" " 49	The Fruit Tree Beetle.
" " 50	Water Wagtails or " Dishwashers.
" " 51	The White or Barn Owl.
" " 52	Gooseberry Blight.
" " 53	The Pear Midge.
" " 54	The Spotted Flycatcher.
" " 55	The Swallow.
" " 56	The Canker Fungus.
" " 57	External Parasites of Poultry.
" " 58	Internal Parasites of Poultry.
" " 59	Improvement of Land Act.
" " 60	The Wood Leopard Moth.
" " 61	Sheep Scab.
" " 62	The Pear and Cherry Sawfly.
" " 63	Destruction of Charlock.



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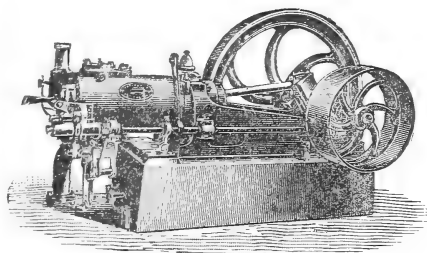
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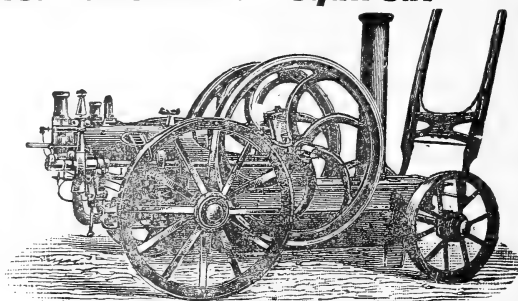
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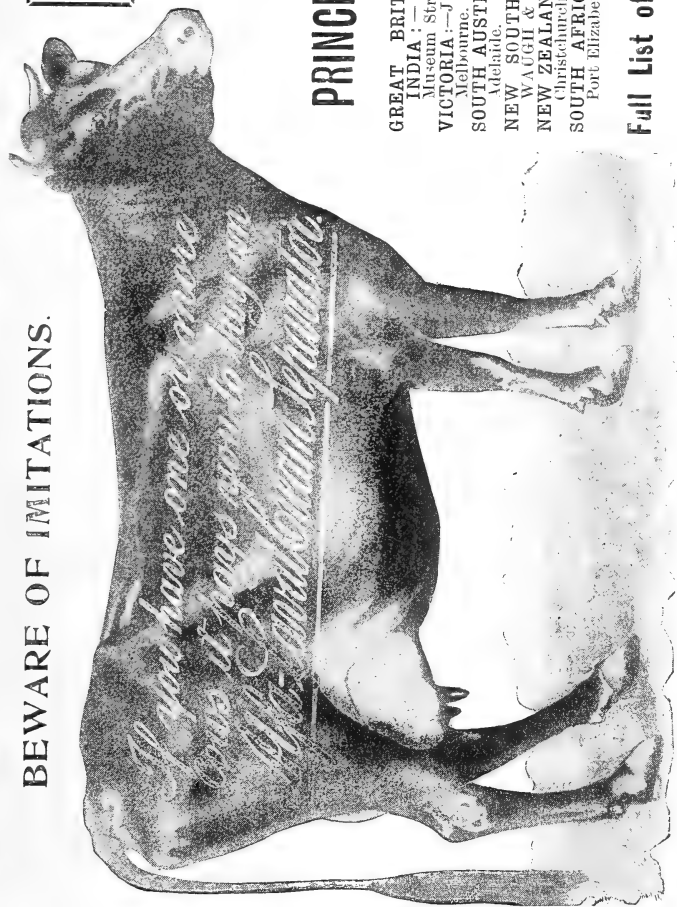


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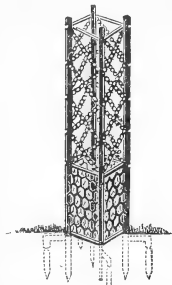
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Do. Minutes of Evidence - - - - - 1893	2 3	C. 6999—I.
Report of Departmental Committee on Swine Fever 1896	0 5	C. 8023.
Second Report do. do. 1897	0 3	C. 8372.
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Report of Departmental Committee on Inland Transit of Cattle - - - - - 1898	0 3½	C. 8928.
Do. Minutes of Evidence - - - - - 1898	2 3	C. 8929.

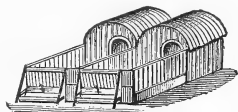
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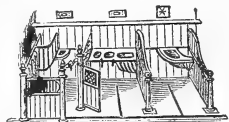
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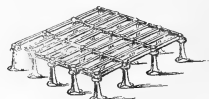
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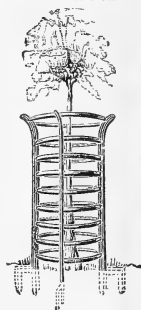


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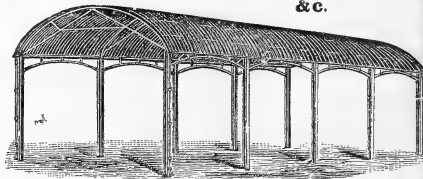


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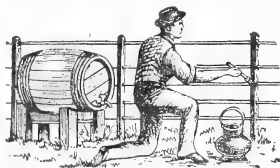
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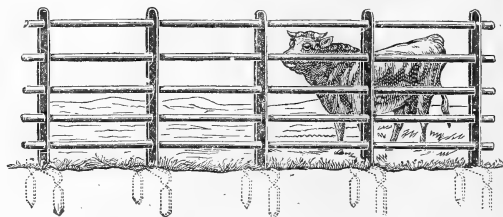
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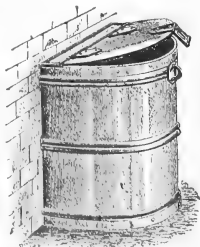
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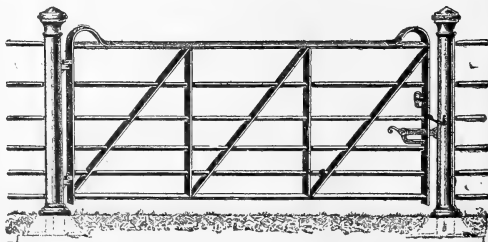


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Communications respecting the contents of this Journal should be addressed to the Secretary, Board of Agriculture, 4, Whitehall Place, S.W.

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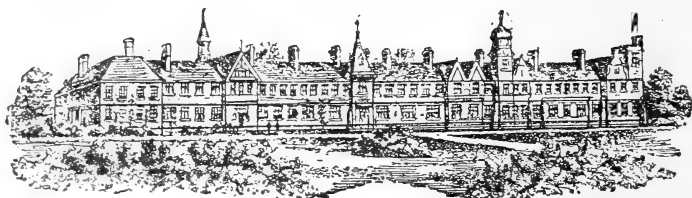
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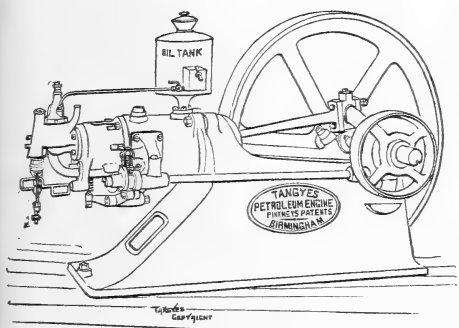
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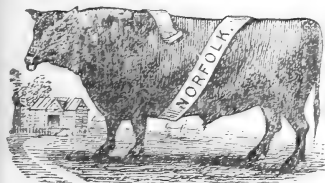
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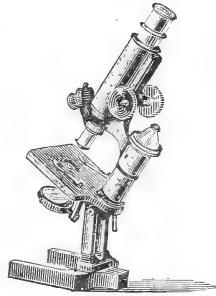
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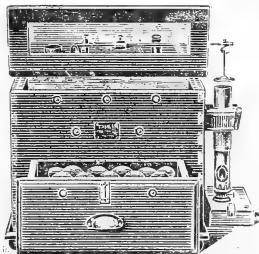
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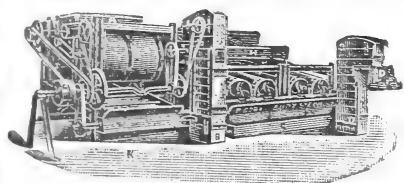
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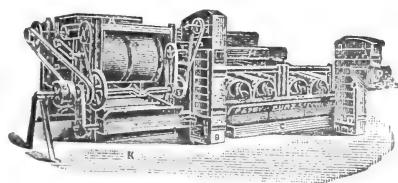
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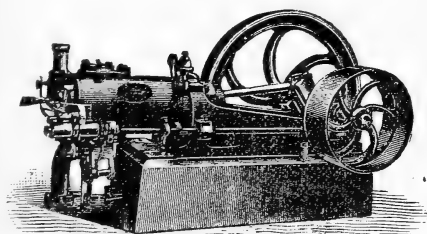
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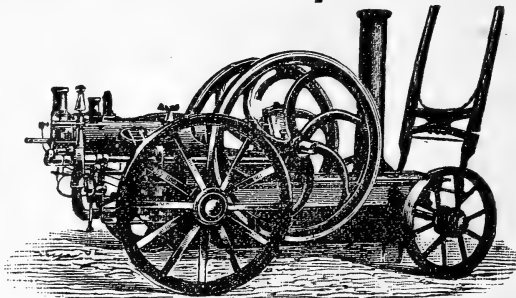
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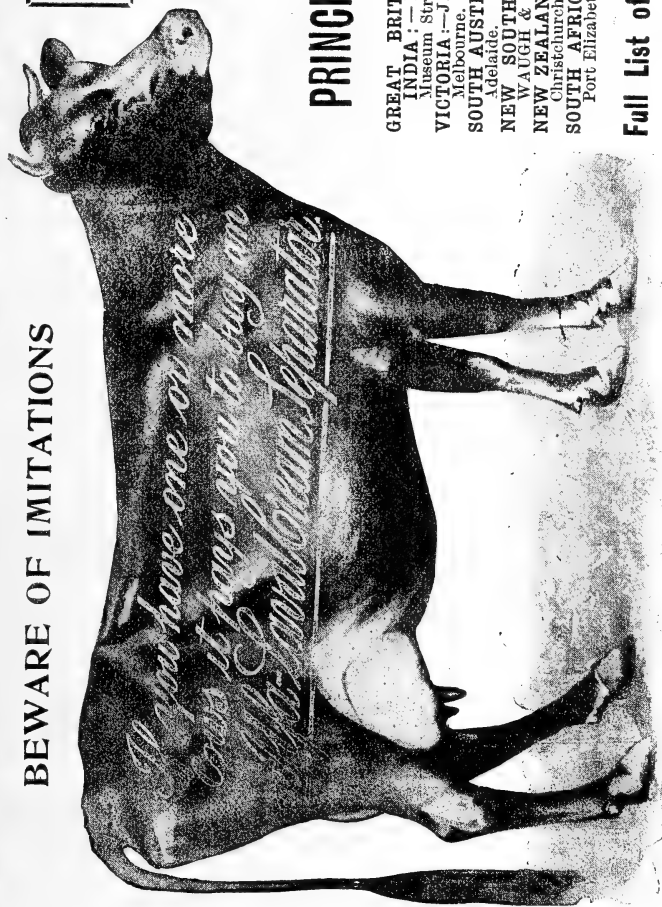


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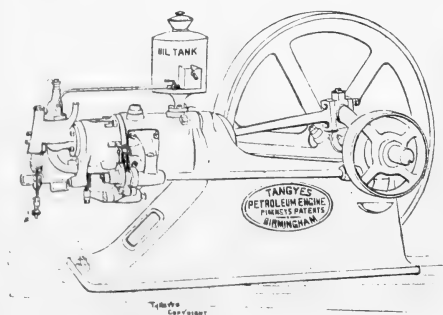
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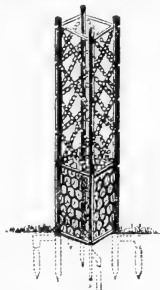
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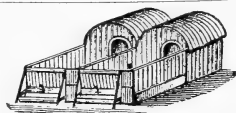
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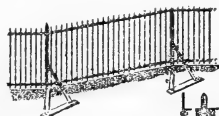
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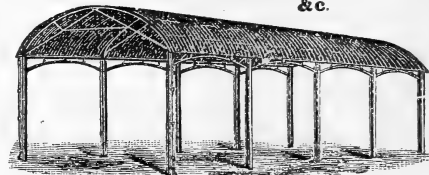


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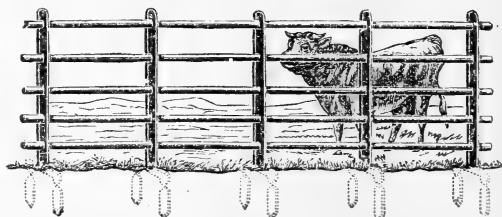
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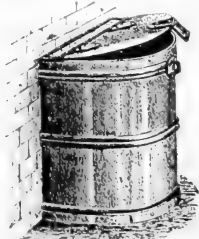


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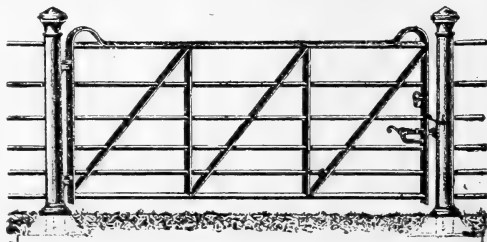
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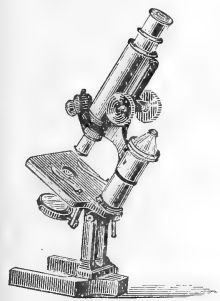
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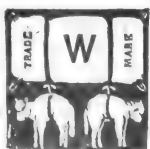
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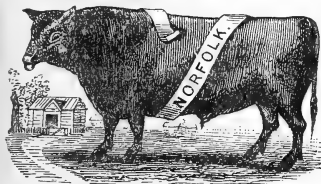
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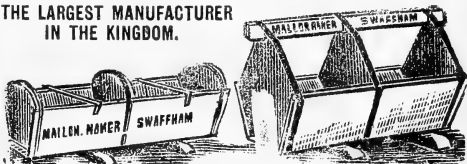
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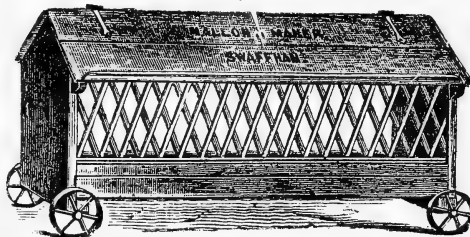


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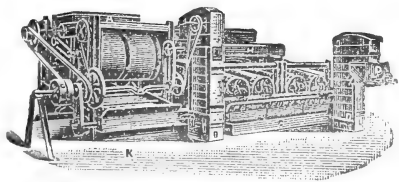
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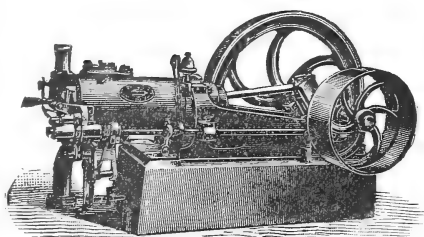
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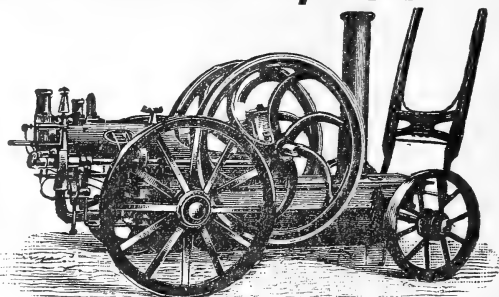
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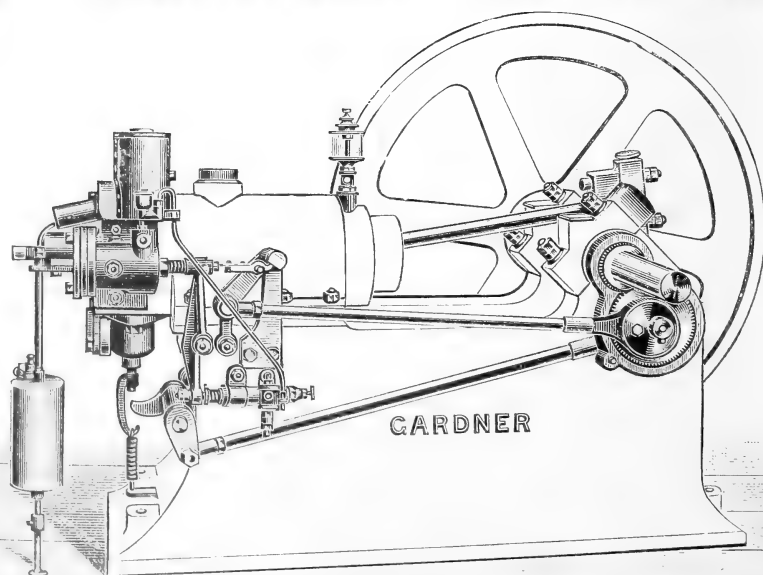


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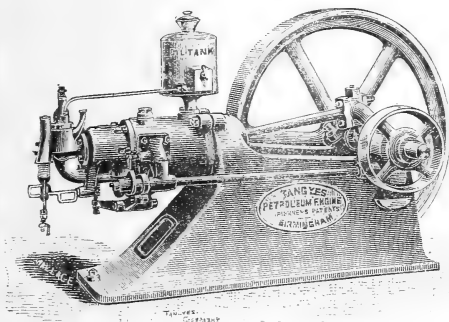
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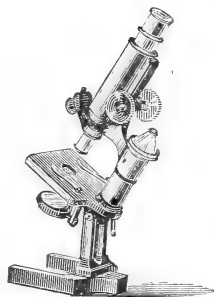


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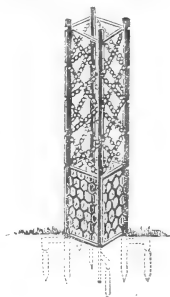
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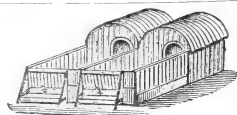
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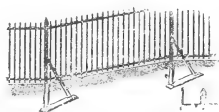
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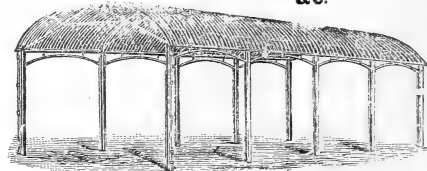


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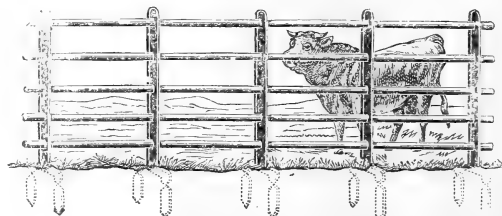
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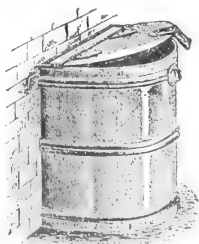
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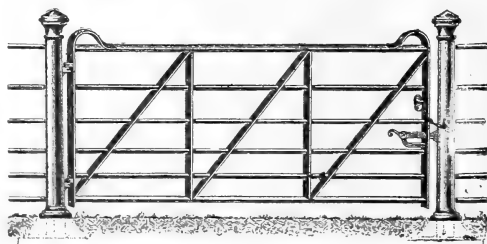


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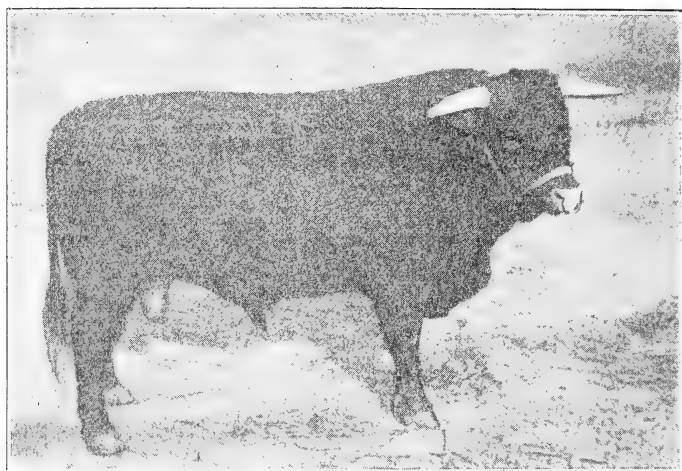
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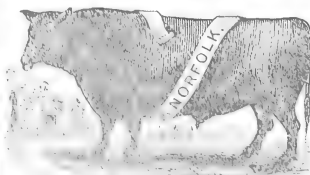
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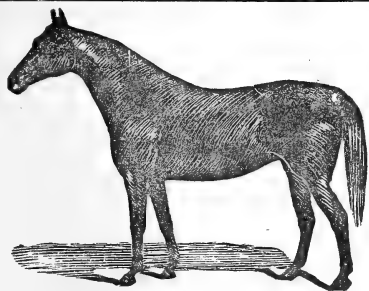
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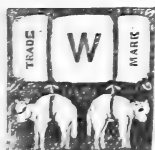
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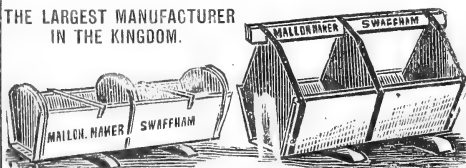
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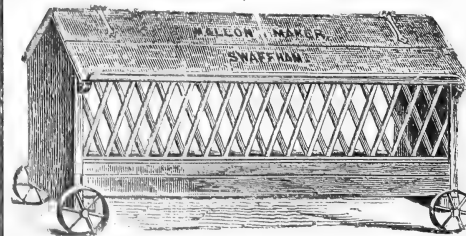
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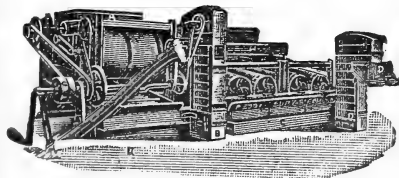
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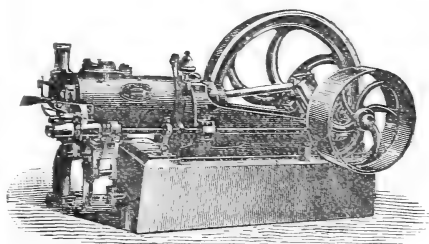
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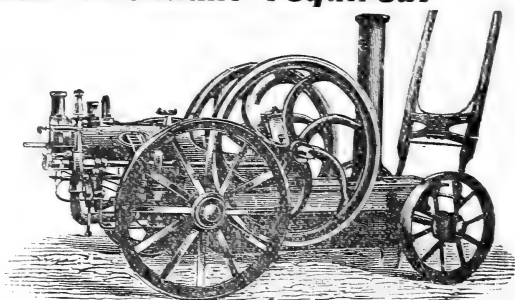
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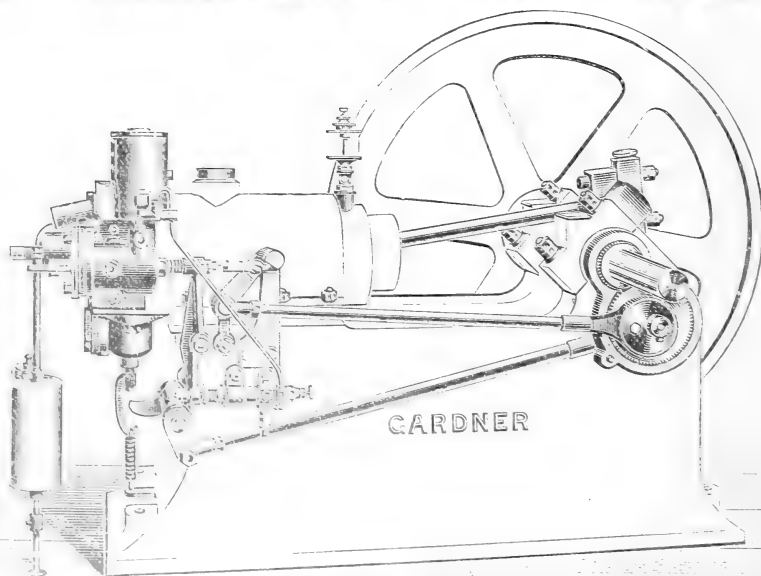


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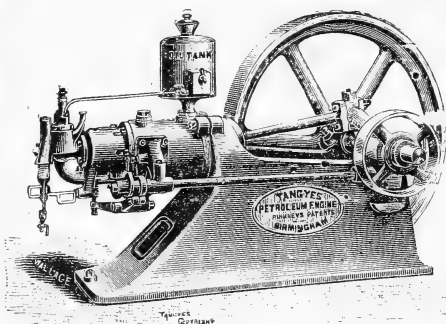
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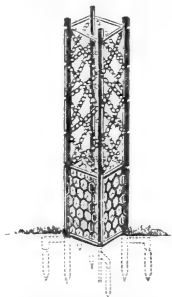
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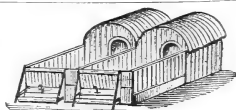
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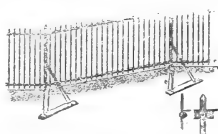
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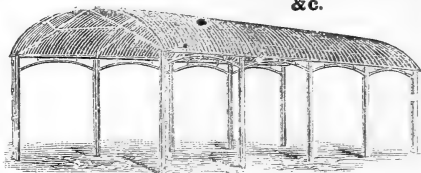


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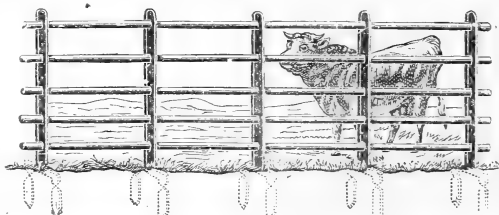
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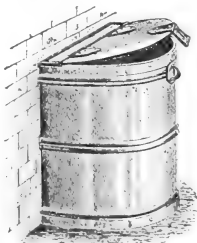
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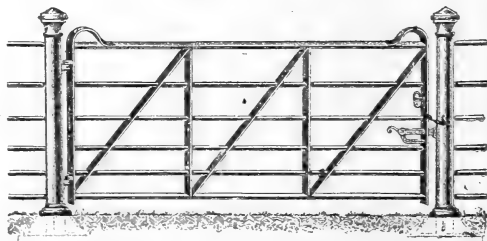


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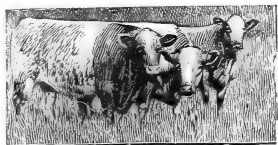
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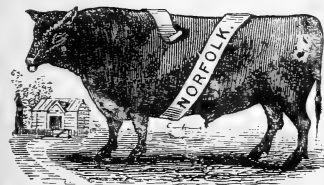
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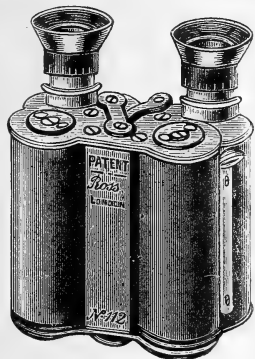
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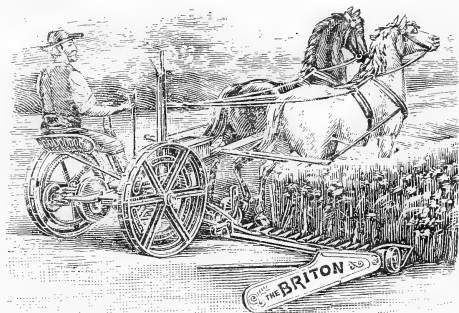
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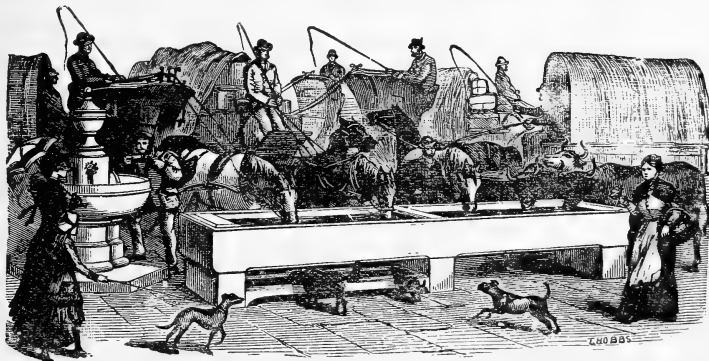
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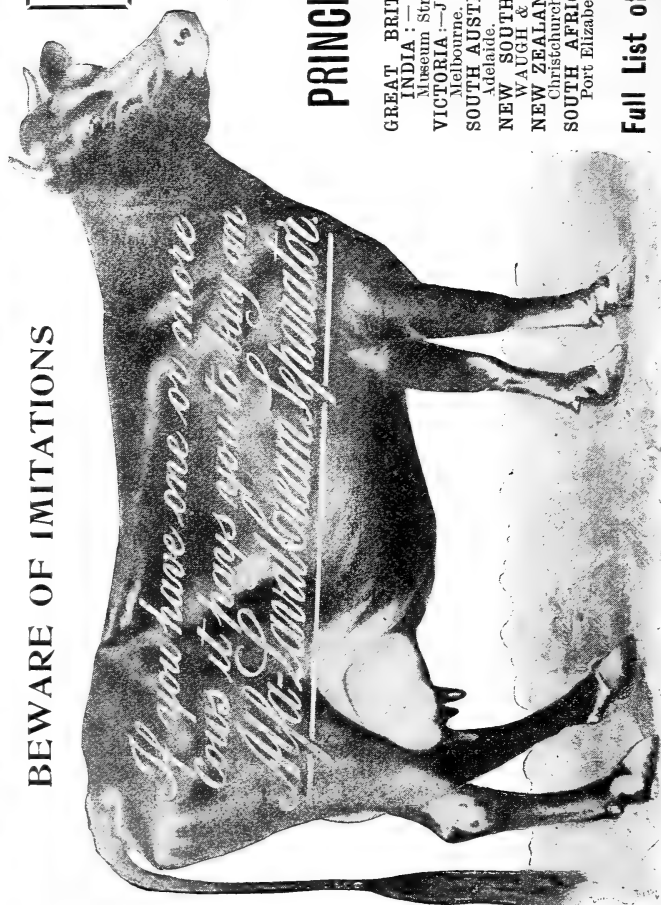
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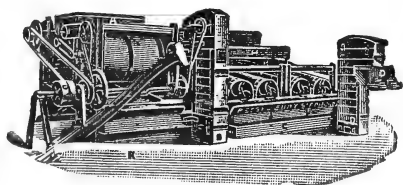
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